POPULAR SCIENCE

OCTOBER · 35c *Monthly*

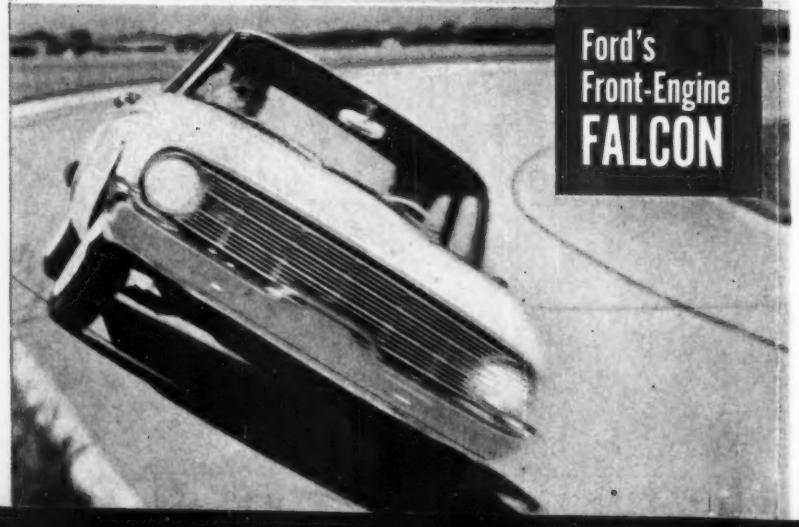
Battle of the NEW SMALL CARS

PAGES 108-121

- News and photos
- Complete specs
- How they compare
- Driver reports
- Engine details

PLUS BIG CUTAWAY DRAWINGS

Chevrolet's Rear-Engine CORVAIR



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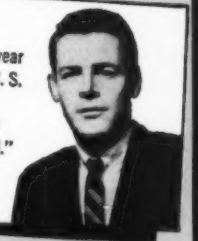

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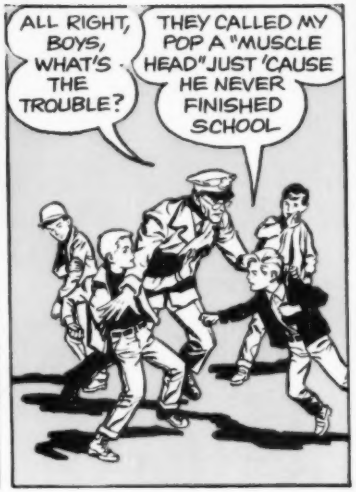
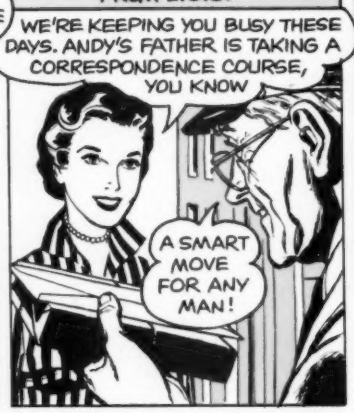
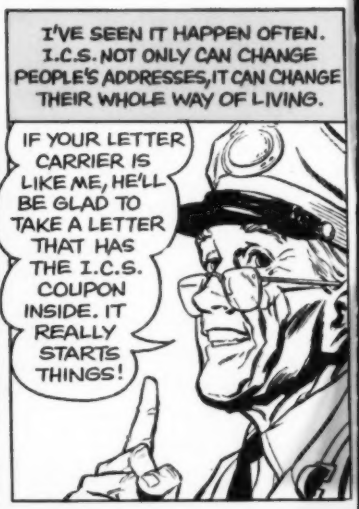


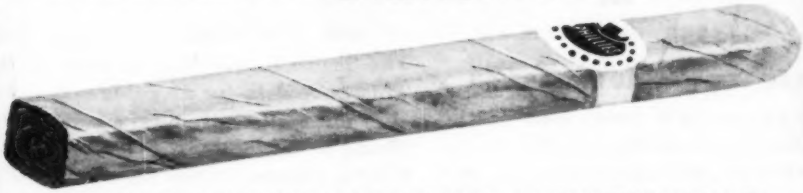




ROUNDUP

Hitch up your horse, pick up the boys, and head for the nearest store to git a pack of

PHILLIES CHEROOTS



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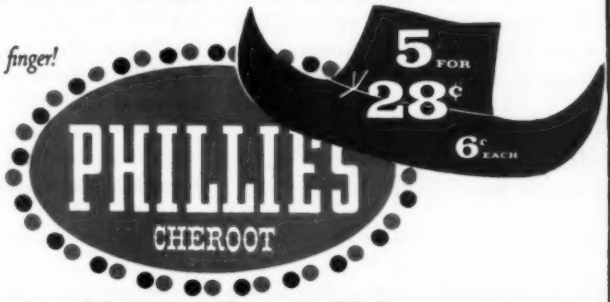

Rustle up 28 cents and buy yourself a pack of 5. If you gotta wait in line and your horse starts chompin' at the bit - tell him "whoa" - you ain't getting back in the saddle 'til you get your CHEROOTS!

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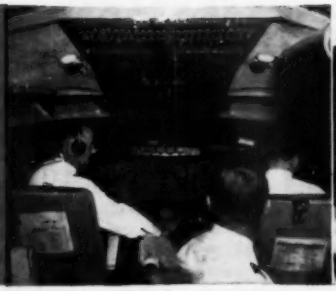

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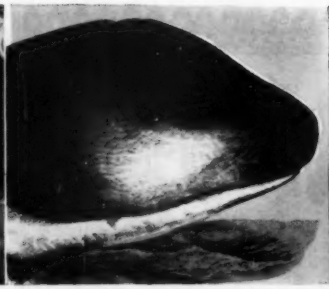

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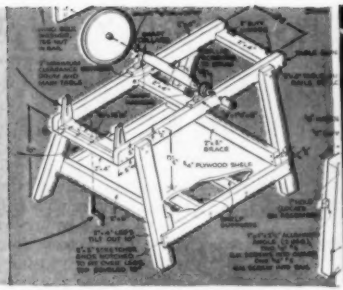

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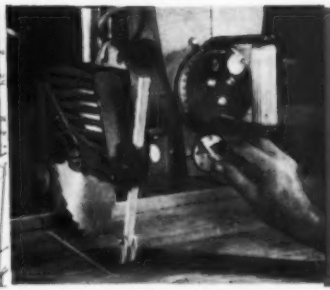

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America's Leading New-Idea Magazine for 87 Years

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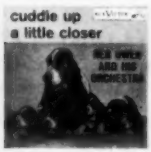

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41. Hi-fi hilarity! German band plays (?) concert pieces polkas, marches, etc.

42. Modern big-band jazz; top West Coast stars. *Chances Are,* other hits.

44. Clancy sings, Bob swings *Shine on Harvest Moon, Whiffenpoof Song,* etc.

45. Romantic piano with orchestra. *Autumn in Rome, Secret Love,* 10 more.

46. 12 love songs. *I'll See You Again, You're My Girl, Time on My Hands,* others.

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22. New Broadway star, top tunes from top musicals, *Flower Drum Song,* etc.

23. Cha-cha versions of Latin tunes. *Perfidia, Frenesi, Tampico, Yours,* etc.

24. 12 pop favorites and light classics. *September Song, Warsaw Concerto, Diane.*

31. Lilting Straus operetta. Risë Stevens, Robert Merrill, Jo Sullivan, others.

32. Liquid sounds from Hammond organ. *Over the Rainbow, Ebb Tide,* etc.

33. Rich baritone of the Graham Crusade sings some most-requested songs.

34. Fantastic sound, realistic atmosphere, familiar songs, virile singing. Different!

35. *My Man, Young and Foolish, They Say It's Wonderful, Yesterdays,* 8 more.

36. 12 meaningful songs. *Whither Thou Goest, Scarlet Ribbons, Only One.*

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PS Readers

TALK BACK

Do Burglars Read PS, Too?

THAT'S a lovely dodge for making your own little cache for hiding jewelry by cutting a hole in the top of a door [Aug., p. 161]. But if I were John Comstock, I'd buy a wall safe anyway. How do you know some burglars haven't the good sense to read PS too?

HENRY WALDRON, Yonkers, N.Y.

Cardiff Giant Is Still Around

THE piece on the Cardiff Giant [July] was great, but left me wondering. Is the giant on display where it can be seen by the public?

C. A. RAMBOW, Madison, Wis.

Anyone interested in seeing the Cardiff giant will find him at The Farmers Museum at Cooperstown, N.Y.

He Wants More on Roads

WHY don't you follow up your 1956 "Report to Motorists" on the Interstate highway system [May '56] and the toll roads [June '56]? What new additions or extensions are planned or underway? What future roads will soon be completed?

A comprehensive up-to-date report on the road program would provide very interesting reading. It would also serve as a guide for planning future trips.

J. L. LOPEZ, Flushing, N.Y.

Radar Still a Hot Subject

THAT letter writer who suggests hooking an aerial to a spark plug to disrupt the cop's radar [Aug.], better not.

Does he realize that by doing this he is transmitting electro-magnetic waves without a license, over a wide band of frequencies assigned for vital purposes by international agreement, and that Congress—not the local cops—has provided some pretty stiff penalties for this?

JONAS ARNOLD, Wilton, Conn.

. . . Connecting a car's spark plugs to the antenna wouldn't generate sufficient noise in the microwave region to interfere with a radar speedmeter. True, there'd be considerable RF generated by shock excitation associated with the spark gap of the spark plug in and around the natural frequency of the antenna and with a number of higher harmonics. These frequencies, of course, are a factor of 1/20 of the frequency of the speedmeter even for very small UHF antennas. These antennas are not the normal ham or broadcast-band type.

Secondly, it would be necessary that the plane of polarization of the antenna be proper in order to get into the receiver of the radar. In general, the antenna on a car is vertically polarized whereas the speedmeter is horizontally polarized.

Finally, a terrific amount of noise in and around the ordinary broadcast and TV bands would be generated. This certainly would be frowned upon by the FCC.

NORMAN G. HANSEN
Automatic Signal Division
Eastern Industries, Inc.
East Norwalk, Conn.

. . . Looks like the new compact cars may give those radar cops trouble. I saw in the paper that some guy in Toronto wriggled out of a speeding ticket because his automobile was too short for the radar to gauge accurately. The radar is set for cars of standard size.

ROGER SCHULZ, Omaha.

Uh-uh. The radar will pick up—accurately—anything on wheels, right down to scooters.

There's Always Another Way

THE tip on adding a window-screen catch by placing a screw in the sill so

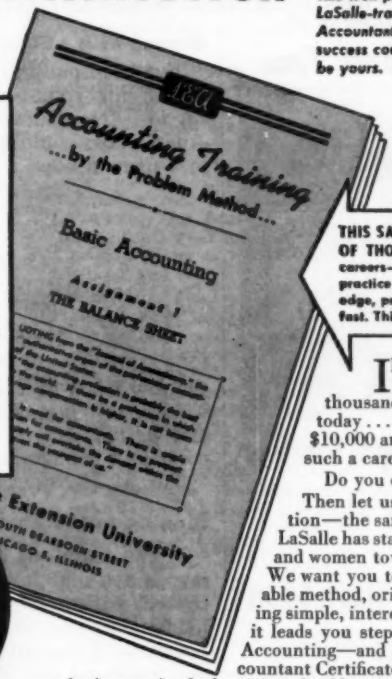
CONTINUED

THIS FREE SAMPLE LESSON

will prove that you can become an expert

ACCOUNTANT...AUDITOR OR CPA

This well-paid LaSalle-trained Accountant's success could be yours.



FREE SAMPLE LESSON

We offer you this free sample lesson so that you can *prove to yourself* that you CAN master Accounting—quickly, thoroughly—in spare time at home.

You will see exactly how LaSalle's famous "Problem Method" works...how you are led step-by-step through actual accounting work—*learning by doing* and not by study of theory alone. First you tackle easy problems, then more difficult ones—until soon you master them all. And at every step you have the close personal guidance of LaSalle's large staff of expert accountants and CPA instructors.

One out of every 13 of all CPAs in the U.S. has been trained by the LaSalle Problem Method

THIS SAME LESSON HAS STARTED HUNDREDS OF THOUSANDS toward well-paid accounting careers—in business, government, and public practice as CPAs. Even without previous knowledge, progress is rapid—earning power climbs fast. This sample lesson will show you why.

IF you have been envying the high incomes and good jobs enjoyed by thousands of men and women Accountants today... incomes ranging from $5,000 to $10,000 and more per year... why not launch such a career for yourself?

Do you doubt that you can?

Then let us send you—without cost or obligation—the same Lesson Number One with which LaSalle has started several hundred thousand men and women toward successful accounting careers. We want you to see for yourself how this remarkable method, originated by LaSalle, makes Accounting simple, interesting, practical, and certain... how it leads you step-by-step to a complete mastery of Accounting—and on up to the Certified Public Accountant Certificate if you so aspire. It doesn't matter whether you've had previous bookkeeping experience, or whether you don't know a debit from a credit. Whether you wish to qualify as an expert accountant, advanced accountant, cost accountant, auditor, government accountant, income tax specialist, or public accountant... you'll find in LaSalle's Problem Method the exact plan to prepare you rapidly and inexpensively—in spare hours at home—without losing a day from your present job.

So right now, today... if you are an adult, employed, and earnestly ambitious for rapid advancement in one of the highest paying fields of business... send your name and address on the coupon below. We'll send you the free sample lesson—plus our illustrated book outlining today's career opportunities and how you can qualify for them. A coupon like this has started many thousands toward greater success. It can do the same for you. Mail it today!

Accredited Member, National Home Study Council

GOOD-PAY JOBS IN MANY FIELDS

If you were an expert accountant right now, chances are you would find yourself in one of the best paid fields of business.

There are several big fields of opportunity open to men and women trained in accounting...opportunities that are wide open and highly inviting, offering maximum income and job security in good times or bad. And under LaSalle's "Problem Method" you can start earning while still learning—either in spare-time or full-time employment...or in business for yourself with no capital required.

Get the latest information by sending for our illustrated booklet, "Opportunities in Accounting"—plus free sample lesson. The coupon at right will bring both to you without cost or obligation. LaSalle Extension University, 417 S. Dearborn St., Chicago 5, Illinois.

Clip Coupon... Mail TODAY!

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Dept. 1083-H, 417 S. Dearborn Street, Chicago 5, Illinois

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Name.....*Age*.....

Street Address.....

City, Zone & State.....

Make More Money Soon Fixing Electric Appliances

Train at Home in Spare Time

Better Pay—More Opportunities

Get into a field where there is important work and opportunity for the trained man. Millions of electric appliances are sold every year. Every wired home now has an average of 8. Many of them need service and repair. Owners pay well to have them fixed quickly, properly. This is your opportunity for a better job, your own part time or full time business. NRI can give you the training you need, at home, in your spare time.

Spare Time Earnings Start Soon

Soon after starting you will be able to earn extra cash fixing toasters, clocks, fans, vacuum cleaners, etc., for neighbors and friends. Keep your job while learning and earning. Put spare time to work for you. Work in your basement, garage, spare room. You'll be amazed how easily, quickly you, too, can start earning many extra dollars. NRI shows you how. Even before you finish training your spare time earnings may pay for the course and equipment.

NRI Sends Tester to Learn and Earn

You need proper equipment to service today's automatic appliances. With this course you get parts to build professional type, multi-use Appliance Tester. You learn to use it. Takes guess work out of servicing. Mail coupon for FREE book and Sample Lesson. See how easy it is to learn. Find out about NRI—a school that for more than 40 years has been training men, through home study, for success, good pay jobs. Our reputation, record, experience back up this course. Write now to NATIONAL RADIO INSTITUTE, Dept. BK9, Washington, D. C.

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ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

the hook can't be removed [June] is not a bad idea. But I think the system I use is simpler and it eliminates marring the sill with a screw hole. Using a pair of pliers, I turn the eye behind the curve of the hook, locking the hook in the eye. I use the same trick on cellar storm sash.

W. L. EASTERLY, Grand Haven, Mich.

Banner with a Strange Device

I'VE been mulling over that marker for identifying your car in a crowded parking lot ["New Ideas from the Inventors," June]. This could be a real boon to the first man to hoist a marker. But what of

the day when everybody raises a "flag"? Then you'll just be looking for the color and design on your flag instead of the color and configuration of your car.

J. M. HASSETT, Queens Village, N.Y.

Singing in His Ears

I WAS installing a 110-volt circuit in my garage and insulated wires came in contact with my hearing-aid receiver. A loud and distinct hum was heard. Curious, I separated the wires and held them individually on the receiver. The hot one sure did sing. The neutral one was silent. Ever since, I've used this method to check for a hot wire.

E. E. STEWART, Plainville, Mass.

Soft-Top Fan Blows His Top

I GOT a bit angry over that letter on the high cost of convertible tops [July]. Apparently Lee Johnson hasn't done much shopping. Nylon tops cost over $100, but vinyl tops are about $75 and you can get a cloth top for $40.

The vinyl top on my car is five years old and it's still quite black and all in one piece. It is easily cleaned with a steel-wool pad from the kitchen.

JOHN BREIDENBACH, Boyertown, Pa.

On Cars Without Wheels

THE hotter engine in Dr. Bertelsen's car-without-wheels [July] worked per-

CONTINUED

How I Turned $1,000 into a Million

--*starting in my spare time*

AN AMAZING TRUE STORY THAT MAY CHANGE YOUR LIFE

by William Nickerson

WHEN I was 25, my wife Lucille and I started saving part of my first modest earnings as a telephone company employee. In three years we had saved the down payment to buy a home. I began looking about for a way to insure a modest retirement income to supplement my telephone company pension.

Starting with only the $1000 cash equity in my home, I pyramided this modest asset into $500,000 by the time I was 42 — all in my spare time. I retired at 42 to concentrate on my investments — with considerable time for gardening, swimming in our backyard pool, hunting, fishing and traveling.

Many friends turned to me for advice on how they could follow me up the road to fortune. Finally I decided to write a unique guidebook, in which I would share my money-making secrets.

But editors who read my first manuscript told me: "Ah, but your success depended on starting during the depression. It could never happen again!"

This led me to study other men's money-making experiences, and current, non-depression-period opportunities. Although I had not intended to increase my holdings, I found so many opportunities that in 2 years I doubled my estate to over $1,000,000.

Now my book, HOW I TURNED $1000 INTO A MILLION, is ready at last. And in it I reveal — and tell how to use — these 4 basic principles of traveling the last remaining road to great fortune still open to the average person:

1. How to harness the secret force of free enterprise — the pyramiding power of borrowed money. If you have ever experienced difficulty in arranging a commercial loan to go into business, you may have the idea that banks won't lend money to the "little fellow" for the purpose of making money. But I will show you how you can get lenders to put up gladly at least three dollars for every one of yours, thereby quadrupling the earning power of your capital.

2. How to choose income-producing multiple dwellings in which to invest. If you are interested in investing in income-producing property for income alone, then you will probably get along all right without any advice from me, although even there I can give you many tips. But if you are out to pyramid your capital, there is a definite set of conditions you should look for.

3. How to make your equity grow. A fair market value of an income-producing property is in ratio to its income. Therefore, if you increase the annual net by means of the steps I outline, you increase the market value of the property — thereby increasing your equity.

4. How to virtually eliminate the "tax bite" on your capital growth. I will show you how you can increase your net worth steadily without its being subject to income taxes — not even capital gains tax! J. K. Lasser's famous guide, YOUR INCOME TAX, says of this method that "the mathematics have almost unparalleled attraction."

If you have about $2500 right now — or if you can save only $50 a month for the next four years — you can start out soundly along the road to a million dollars. To enhance your progress you will need an additional personal investment of $50 a month, or $600 a year, for two more years after that, making a total investment of $3600. But then you will start receiving income from your investment. *In addition,* if you follow my instructions, your capital can grow at the following rate:

In 2 years, your $3,600 grows to $5,800.
In 4 years, you have $11,575.
In 6 years, $21,681.
In 8 years, $39,363.
In 10 years, $70,548.
In 12 years, $124,884.
In 14 years, $219,972.
In 16 years, $386,376.
In 18 years, $677,583.
In 20 years, $1,187,195.

"There Must Be a Catch to It!"

Right now, it would be understandable if you were sputtering, "But — but — it's not that simple. There *must* be a catch to it!"

Of course there's a catch to it! There are hundreds of "catches" — hundreds of pitfalls and traps for the unwary who have never traveled what I call the "realty road to riches." But I made it, by learning as I went along. And you have a priceless advantage which I never had — the advantage of being able to know beforehand everything I had to learn by trial-and-error.

This method of making money is *not* dependent on continued economic boom or inflation. It *is* benefited and underwritten by America's continuing *population* boom, which is expected to result in 77 million more people by 1980. And it is comparatively recession-proof.

Read Book for 2 Weeks Free — Then Decide

The publishers invite you to examine my book free for two weeks in your own home. If you're not impressed, return the book in two weeks and pay nothing, owe nothing. Otherwise it's yours to keep for only $4.95 plus a few cents postage. Mail coupon or write to: SIMON AND SCHUSTER, Publishers, Dept. 416, 630 Fifth Avenue, New York 20, N. Y.

SIMON AND SCHUSTER, Pub., Dept. 416
630 Fifth Ave., New York 20, N. Y.

Please send me William Nickerson's 497-page book, HOW I TURNED $1000 INTO A MILLION, for two weeks' free examination. If not convinced that this book can pay for itself literally thousands of times over, I may return it in 14 days and pay nothing. Otherwise I will keep it and remit only $4.95 plus a few cents postage as payment in full.

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QUAKER STATE OIL REFINING CORPORATION, OIL CITY, PA.

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1859— 100th Anniversary of Drake Oil Well and Founding of the Petroleum Industry —1959

fectly—until he tried it over water in front of a battery of newspaper and TV cameramen. Then spray shorted ignition

wires, killing the engine. The photo shows the sad result.

L. T. JOHNSON, Chicago.

. . . This picture of a wheel-less craft shows it just about to leap out of the

hands of its inventor, Toivo Kaario [left]. He invented, built and patented the craft away back in 1935. It's good to know that the first vehicle without wheels was built in Finland—and didn't come out of Russia in eighteen hundred and umpteen.

P. SUOVA, Kuora Lieksa, Finland.

No False Starts with His System

AFTER reading about the visual starting gun for track meets [July, p. 111], I decided to let loose an idea of my own: electrical starting blocks for track racing. Normally, the contacts would be open and the runner would have to keep his foot in the block so the timer could fire

CONTINUED

Learn Radio-Television Electronics

by Practicing at Home in Your Spare Time

WITHOUT EXTRA CHARGE YOU GET special NRI kits developed to give you actual practice with Radio-TV receiver or broadcasting circuits and equipment. All equipment is yours to keep.

RADIO-TV BROADCASTING (see above) offers important positions as Operators and Technicians. RADIO-TV SERVICING Technicians (see below) needed in every community. Their services are respected, their skill appreciated.

Fast Growing Field Offers You Good Pay, Success, Bright Future

J. E. SMITH
Founder

Bigger than ever and still growing fast. That's why Radio-TV has special appeal to ambitious men not satisfied with their job and earnings. More than 4,000 Radio and TV stations. More than 150 million home and auto Radios, 40 million TV sets. Color TV promises added opportunities. For the trained man, there are good jobs, bright futures in Radio-TV Servicing or Broadcasting.

Training PLUS opportunity is the *ideal combination* for success. So plan *now* to get into Radio-TV. The technical man is looked up to. He does important work, gets good pay for it. Radio-Television offers that kind of work. NRI can supply training quickly, without expense of going away to school. Keep your job while training. You learn at home in your spare time. NRI is the OLDEST and LARGEST home study Radio-TV school. Its methods have proved successful for more than 40 years.

Added Income Soon - $10, $15 a Week in Spare Time

Soon after enrolling, many NRI students start to earn $10, $15 a week in spare time fixing sets. Some pay for their training and enjoy extra luxuries this way. Some make enough to start their own Radio-TV shops. NRI training is *practical*—gets quick results. Easy to understand, well illustrated lessons teach you basic principles. And you LEARN-BY-DOING by practicing with kits of equipment which "bring to life" things you study.

Find Out What NRI Offers

NRI has trained thousands for successful careers in Radio-TV. Study fast or slow—as you like. Diploma when you graduate. Mail coupon now. Paste it on a postcard or mail in envelope. ACTUAL LESSON FREE. Also 64 page catalog that shows opportunities, shows equipment you get. Cost of NRI courses low. Easy terms. **NATIONAL RADIO INSTITUTE, Dept. 9KB, Washington 16, D. C.**

N.R.I. TRAINED THESE MEN FOR SUCCESS

"I was repairing Radios by 10th lesson. Now have good TV job." M. R. LINDEMUTH, Fort Wayne, Ind.

"Doing spare time repairs on Radio and TV. Soon servicing full time." CLYDE HIGGINS, Waltham, Mass.

"I had a successful Radio repair shop. Now I'm Engineer for WHPE." V.W.WORKMAN, High Point, N.C.

"There are a number of NRI graduates here. I can thank NRI for this job." JACK WAGNER, Lexington, N. C.

VETERANS Approved Under G.I. Bills

SEND FOR BOTH FREE

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Dept. 9KB Washington 16, D. C.

Mail me Sample Lesson and 64-Page Catalog FREE. (No salesman will call. Please write plainly.)

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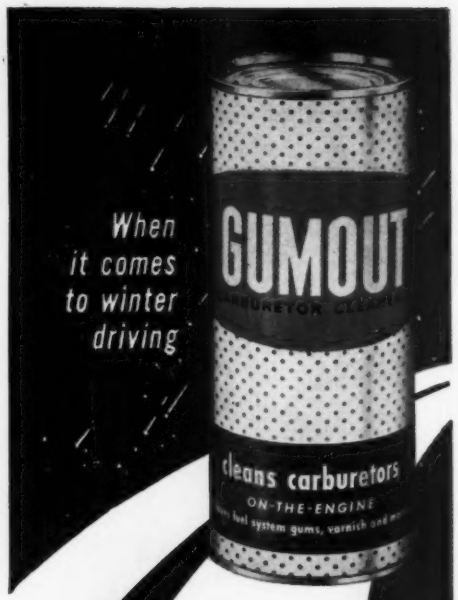


cars start faster (use less gas, too) with GUMOUT

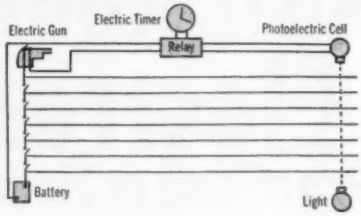
You'll get quicker, battery-saving starts this winter if you clean your carburetor with GUMOUT now. And a clean carburetor gives you a smoother running engine with improved gas mileage, too.

Just add GUMOUT to your gas tank. It cleans the carburetor while you drive. Thousands of car owners count on GUMOUT all year 'round. Why don't you?

Sold at most service stations and auto supply stores.

GUMOUT DIVISION
Pennsylvania Refining Co.
2670 Lisbon Road, Cleveland 4, Ohio

the gun. Firing the gun would start the clock, and the clock would stop when a photocell beam was broken. The system



would eliminate false starts and provide accurate timing.

E. LINDER, Fullerton, Cal.

It would work, and would time the winner, though no others. But it wouldn't replace the judges—and it wouldn't determine who *won.*

Brazil Was First?

LAST April, you showed an "airborne" gas station just built in Cincinnati. I finally got a picture to show that we have

one, too, and ours was built in 1940. The people of my town say (jokingly) that the five-story building across the street from it will be razed for the takeoff.

J. DA FONSECA, Porto Alegre, Brazil.

Lights Out? Try This

I HAVE rigged up my car so that I never need worry about a headlight conking out. Maybe others would like to try it, or get a garageman to do it:

Run a wire direct from the battery terminal to a switch mounted in front of the driver, then connect a wire from the switch direct to the headlights. Put a fuse in the line just after it takes off from the battery-cable terminal.

This arrangement can fail only when the main battery cables have come loose, or a light filament has burned out, or the fuse has blown. Such failure is extremely unlikely and will never occur if the owner gives the car proper periodic inspection.

ROY P. FRY, Portland, Ore.

CONTINUED

THIS is how you train at home to become a SERVICE ENGINEER in the Air Conditioning and Refrigeration industry...

An old industry offers bright new opportunities

Almost any industry has jobs for men with special skills. In many cases, good pay and steady work are the rule. Yet—would you be happy in being a repairman all your life? Wouldn't you rather have a job that presents a *challenge*—still *bigger* money—an opportunity to *grow?*

Listen, if you are ambitious to *keep climbing:* The air conditioning and refrigeration industry is growing so fast that 20,000 newly-trained technicians are needed each year. They can come only from the technical schools. Because installation and repair work is important, graduates may expect high pay and security right from the start. That's not all. *A well-trained technician has a great opportunity to develop into a Service Engineer.* As a matter of fact, 90 percent of all refrigeration engineers are former repairmen!

If you seek a *career,* not just a job, get into air conditioning and refrigeration. Your first step is to gain skill and knowledge. Learn at home by practicing with 25 big kits that CTI sends. Acquire experience as you train. CTI ships you all parts and tools—with shop-proved instruction—to build a heavy-duty, commercial-type, ¼ h.p. condensing unit (illustrated above.) You complete 23 field-type projects—do 10 trouble-shooting jobs. You make home a training center!

So practical is CTI training that many students earn extra cash in spare time soon after they start. They make calls on their own, or get part-time jobs with local appliance dealers or air conditioning contractors.

But read the complete story. It is told in a new CTI catalog. *Just fill out and mail coupon below for your copy.* Sample lesson included. No cost nor obligation—Commercial Trades Institute, Chicago 26, Ill.

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This Powerful Feridium* Anode is built into every

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Resin-weld*

OIL FILTER

THAT'S WHAT MAKES IT THE ONLY FILTER IN THE WORLD THAT COMPLETELY REMOVES BOTH ENGINE SLUDGE AND ACIDS — STOPS THE TWO MAJOR CAUSES OF ENGINE WEAR!!

Discover for yourself the amazing action of this entirely new kind of oil filter cartridge — a miniature oil refinery under the hood of your car! Discover how its **DUAL ACTION** not only traps injurious micron-size particles (abrasives sludge) too tiny for the eye to see — **IT ALSO NEUTRALIZES AND REMOVES ENGINE-EATING ACIDS!**

The patented Resin-weld* one-piece construction insures Positive Filtration from oil change to oil change. The resin-impregnated, heat-treated and cured accordion element in the plated metal shell (no paint to contaminate the oil) — the thousands of pre-determined openings — all provide unrestricted oil flow.

If you demand top engine performance and value your engine life, insist on a **LEE Feridium* Anode OIL FILTER.** It's two filters in one — **it gives you twice as much engine protection at no extra cost!!**

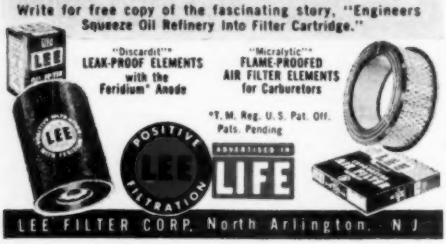
THIS COMPARATIVE PERFORMANCE★ CHART OF THE 4 MOST-POPULAR OIL FILTERS PROVES LEE Feridium* Anode FILTER SUPERIORITY

	LEE Feridium* Anode FILTER	OIL FILTER "A"	OIL FILTER "B"	OIL FILTER "C"
RATE OF FILTRATION	5 Min.	8 Min.	9 Min.	5 Min.
ACID-DESTROYING PROPERTIES	COMPLETE	No effect	No effect	No effect

★ From Independent tests By The Carlson Laboratory.

LEE Feridium* Anode FILTERS conform to functional standards set by the Society of Automotive Engineers, U. S. Army Procurement, Fort Belvoir Research and Development and initial equipment specifications of car manufacturers. Sold all over the world at Service Stations, Garages, Accessory Stores and Car Dealers. Also available for most imported cars.

Write for free copy of the fascinating story, "Engineers Squeeze Oil Refinery Into Filter Cartridge."



The Rear-Steering Trailer

AUGUST Picture News [p. 111] shows a trailer with a fixed middle axle and a pivoted axle at the rear. You say: "This keeps rear wheels of a long trailer within the arc of tracks of its tractor. Anything the tractor clears also is cleared by the trailer."

Oh yeah? Perhaps the rear wheels of the trailer will "track" behind the tractor, but what are you going to do with the fixed wheels at center? I know a few streets I'd like to see this tractor-trailer arrangement attempt to negotiate.

J. RAMSEY, Philadelphia.

Don't Throw Away that Old PS

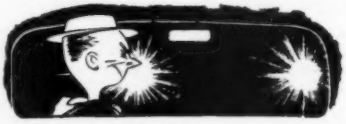
YOUR magazine, when read, should be sent abroad by a large percentage of your subscribers. This would do wonders to build up understanding and respect for the U. S. A. Magazines are our best ambassadors of good will and it's stupid not to use old copies, especially when so many foreigners can read English.

Won't you therefore urge your readers to mail their used issues to some foreign address? They may send them to the USIS Chief, c/o American Embassy, in whatever foreign capitals most interest them; to any university librarian; or to any foreign address they may have. If they'll drop me a line, I'll be glad to supply some worthy foreign addresses.

ALBERT CROISSANT, PRES.
Magazines for Friendship, Inc.
Occidental College, L. A.

Christmas-Tree Tail Lights

WHILE following '59 Fords, I noticed that when the foot brake is applied, all



anyone behind can see is almost blinding light from the stoplights. I went home and altered my own '59 Ford.

I painted the inside surfaces of the lenses black (the part that reflects light to the side) to retard the reflection of light on the decorative trim that surrounds the light. Maybe other readers would like to follow suit.

J. H. HUTCHINSON, Leavenworth, Kan.

New Success Program Gives You Short-Cuts to Executive Skills

AT AMAZING LOW COST—TAKES MINUTES A DAY!

Revolutionary New Monthly "Progress Kits" Develop the Abilities You Need to Win Faster Promotion, Increase Your Earning Power

NOW – in your own home – you can master the fundamentals of success – pave the way to a richer life for yourself and your family. You can benefit from the most practical, scientific plan ever devised to help men increase their earning power. Others have paid hundreds of dollars to learn the tested and proven *success secrets* available to you in this Program at the low cost of *only a few pennies a day.*

The New Nelson Doubleday PERSONAL SUCCESS PROGRAM

Month by month, the Nelson Doubleday Personal Success Program will show you how to develop the basic executive abilities that pay such handsome dividends today. One by one you'll acquire the important skills that mark "the man on the way up"–skills in getting along with people – creating new ideas – understanding business figures – winning new friends wherever you go – speaking in public – organizing your time efficiently–writing business letters, reports and memos.

You start with a remarkable memory trainer. Then every 30 days you will receive a new self-training Progress Kit on an essential success subject.

There has never been anything like these "Progress Kits" available – for completeness, authority and detailed step-by-step guidance. Nothing has been left out. The expert business leaders, psychologists and educators who planned the Program have included all the know-how *and actual practice* you need. Their simplified new self-instruction method enables you to gain "practical experience" in the odd moments that now go to waste every day.

Sample "Memory-Trainer Kit" only 10¢

To introduce you to this new kind of personal achievement plan, Nelson Doubleday offers you a valuable "sample kit" almost as a gift. You'll receive a remarkable 10,000 word handbook – *How To Remember Names and Faces* – that gives you the secrets of professional memory experts. In the first five pages you'll learn one easy trick that will double your memory power – *overnight*. Soon your new "automatic memory" for names, faces, facts will win new friends, gain recognition on the job.

As with each Progress Kit in the Program, a set of handy practice and application cards accompanies the memory handbook to help you "learn by doing." Slip them into the pocket case provided – for use in your spare moments. They've been scientifically planned to add a "real life" dimension to self-instruction.

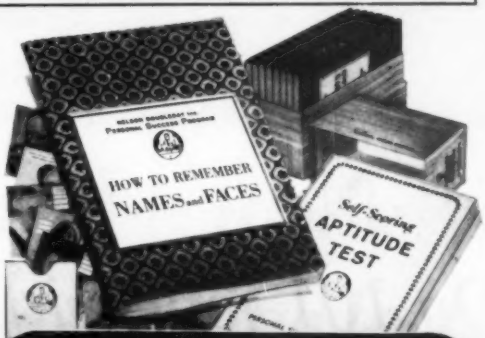
Along with your memory training material – as an extra bonus to launch your own Success Program – you will receive a self-evaluation Aptitude Test.

Will you invest 10¢ in your future?

There's plenty of room for you "at the top." Leaders are sought and welcomed more than ever in the business world today. To begin qualifying for the opportunities ahead, accept the valuable introductory package offered by the Personal Success Program for only 10¢. There is no obligation whatever – and no salesman will call. This is merely a "demonstration offer."

If you are delighted with your first kit and wish to continue with the Program, you will receive a new Progress Kit each month, for which you will pay – not the many dollars charged by most "schools"–but only $1 plus small shipping cost. You stop whenever you like. Mail the coupon today. The Nelson Doubleday Personal Success Program, Garden City, N. Y.

START WITH PRE-TESTED "MEMORY-TRAINER KIT" FOR ONLY 10¢



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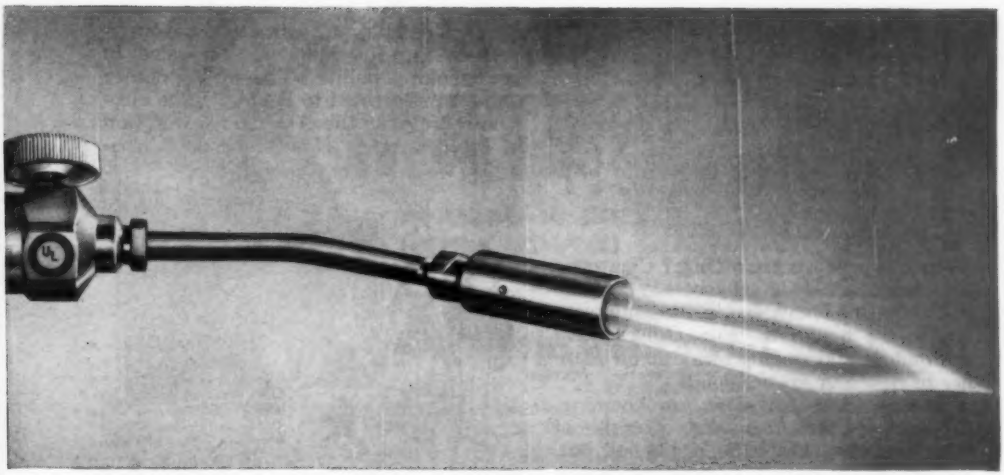

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...have you heard...?

What'll you be smoking? Cigarettes that contain mostly tobacco—or any tobacco at all—may be in the minority within the next few years. Researchers are huffing and puffing away at all manner of new and exotic blends.

Though cigarette sales are booming, lung-cancer statistics—and denials of their validity—keep the argument hot. There are antismoking campaigns under way in many high schools. One company has begun to plug its cigarettes (Vanguards) in a "smoke without fear" campaign. Vanguard bills itself as the no-tar, no-nicotine, no-arsenic, in fact, no-tobacco smoke. It's a blend of nine vegetable fibers.

Emboldened by the success of menthol flavor, (latest entry is Lorillard's "Spring"), the sample-takers for many big cigarette firms have tested reactions to a wide assortment of tastes and smells. They report the public smiles with favor on smokes that smack of apple-blossom, rum, cinnamon, and carnation flavors.

Even the Russians are interested in our smoking habits. The most popular question addressed to RAMAC, the electronic brain at the American exhibition in Moscow was, "How much do Ameri-

can cigarettes cost?" The machine clicked out:

"In the United States the price of a package of 20 cigarettes varies from 20 to 30 cents. The average semiskilled worker in the United States earns enough money in one hour to buy about eight packages. Almost all cigarettes sold in the United States are of American manufacture."

Russians pay about 16 cents for a pack of 20 unfiltered cigarettes. The average semiskilled worker can buy four packs with an hour's wages.

Confidence men are doing fine, glumly reports the Better Business Bureau. Times are good and people and their money easier to part. Sharpies drop their "make-money-at-home" schemes, and push for bigger stakes: stock swindles, home-remodeling rackets, phony repair appraisals.

Biggest moneymakers, ($100 million a year), may be the weight-reducing pills—the ones guaranteed to slim you without diet or exercise.

Worried by wild claims, the American Medical Association published results of experiments with 81 fat patients among mentally deficients (chosen to lessen the psychological factors involved).

In "blind" tests—where neither nurse nor patient knows what drug is being given—they found no weight loss and no appreciable difference between patients given phenylpropanolamine, the prime ingredient of the popular pills, and patients given sugar pills. A group given a prescription drug recognized as an appetite-reducer, *did* show a weight drop, however.

Trouble with con artists is that they slip through legal loops or switch from

CONTINUED

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...have you heard...?

racket to racket too fast for authorities to catch up:

The color TV fraud. One of last year's frauds was the TV screen that was supposed to convert your black-and-white set to color. It did. The magic gimmick was a thin, transparent sheet of plastic tinted blue on top, beige in the middle, green on the bottom.

The promoter was arrested and indicted, then paroled pending trial. Two months later he was picked up on a grand larceny charge for stealing "TV converters" from a supplier. Trial was postponed and he was let out on bail.

Still later, authorities grew suspicious of advertising for "Bathe A Weigh"—a compound you add to your daily bath supposedly to trim off as much as 30 pounds painlessly. Guess where the company does business? Right: same address and phone number as the TV company.

Men are showoffs. Would-be supermen, they're careless and often foolhardy. Sound like an ardent feminist talking? No: just some comments by the director of the home division of the National Safety Council, Thomas Fansler. Here's his case:

- Seven out of 10 persons who die in, or as a result of, accidents are males.
- Men get killed more often in accidents involving fires, drownings, firearms, railroads, poisons.
- They get killed three times as often in automobile accidents.

Thirty years ago the average white female could expect to outlive the male by three years; now it's up to six.

Fansler says it's because women are more careful. They light matches away from, rather than towards themselves. Then the hazardous jobs around a house are a man's; the potentially lethal tools, his. And if he's a showoff . . .

Fansler advises wives: Urge your husband to play it safe in working around the house. Tell him he's not expendable.

Hunting Abominable Snowmen will be a side venture in Sir Edmund Hillary's latest Himalayan trek.

The Mount Everest conqueror wants to test how well man can acclimatize himself to rarefied atmosphere—a consideration in space travel. He'll take half a dozen picked men to winter in the Tibetan mountains at heights ranging from 16,000 to 20,000 feet. To condition themselves, they'll make excursions on skis—hopefully seeking the trail of the elusive, hairy, manlike creature supposed to inhabit this forbidding region of Asia.

The following summer another group will set up camp with oxygen supplies at a two-day climbing distance from the top of the lofty peak. Sir Edmund's crew will then make a less breathless dash for the summit.

Although he won't be one of the six, Sir Edmund has had some oxygenless experience: He remained for half an hour at the top of Everest (29,000 feet), without using a mask. A year later Swiss climbers managed the feat for an hour.

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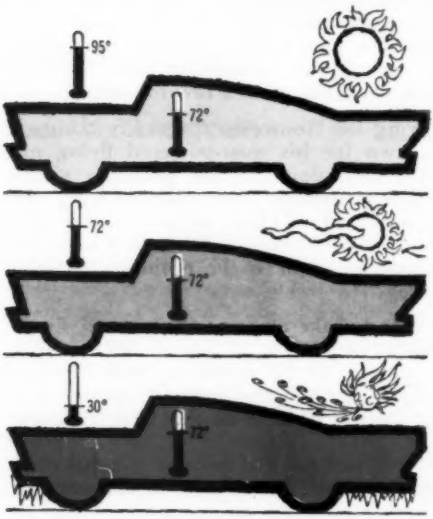
The month in science

Air conditioning in living color. What looks like a foolproof scheme for keeping things at a comfortable temperature—no moving parts, no electricity—is coming out of space research. The idea is to make a thing change color automatically: get darker and absorb more heat when it's cold, get lighter and reflect more heat when it's hot.

First trial of a coating that does this will be on satellite skins. But the same method should also provide color air conditioning for homes, cars, planes and even personal clothing. You might wear a suit dyed to darken and lighten with changing temperature. Your car and the walls of your house might be painted in changeable color. Windows and sunglasses could even be made with built-in automatic blinds.



Paints that change color with heat have been used for a long time as rough thermometers—on railroad wheel bearings, for instance, to warn inspectors of trouble brewing. But these materials just indicate the temperature without attempting to control it. And using color to absorb or reject heat is an ancient idea—the white-painted roof, light clothes for the tropics, soot on an ice-covered walk. But these colors didn't adjust themselves; they worked only for particular temperature conditions.

Credit for combining the two ideas goes to Rudolf X. Meyer of Space Technology Laboratories (big operators in the missile and satellite business). He was nudged by the trouble that the Pioneer I space probe ran into last year. It had been painted (in unchanging color) to control the temperature of delicate instruments inside. Only it went off course, into a different temperature region, and some instruments failed.

So far Meyer has found 35 chameleon-like substances that change color back and forth as the temperature goes up and down. Some are paints, others are multi-layered plastics.

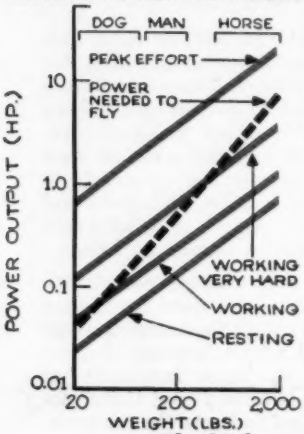
Flying on a bicycle built for two. An Irish aviation expert is out to succeed where Daedalus and Leonardo da Vinci failed: get men to fly on their muscle-power alone. T. R. F. Nonweiler plans to do it by adding glider wings, a tail-mounted propeller and assorted gearing to a tandem bicycle. The birdmen would run the machine by pedalling—first driving the wheels to takeoff speed—then pumping the propeller to fly (briefly).

Theoretically it should be possible, a new study

CONTINUED

by English physiologist D. R. Wilkie shows. Only small animals have the pounds-per-horsepower ratio to fly (the heaviest airborne bird is the great bustard, at 32 pounds). As animals' weights increase, their power output also goes up, but the power required for flight goes up faster yet (see graph). That's why a man—assuming nature had endowed him with wings at no increase in weight—still could not develop enough energy to fly steadily hour after hour, although he would be able to fly the way he runs, five to 30 minutes at a time. The added weight of artificial wings and hardware puts man-flight into the just-barely class. Then a man could generate the energy required only by an exhausting burst of effort that might keep him aloft a few minutes.

MUSCLE POWER FOR FLIGHT



This figuring led Nonweiler to specify a bicycle built for two for his man-powered flying machine, two men doubling the power available without proportionately increasing the load. (He ruefully comments, "Three or more men seem somehow to invite derision, although it may well be true that an 'eight' is the optimum in flying as in rowing!")

The birdmen should be able to take off from the ground, fly for a minute and a half, and get as high as 25 feet on their muscle power alone. The time aloft could be doubled (three minutes) by using an extended takeoff run to store power in twisted rubber bands, but Nonweiler doesn't want to do that at first. Might seem like cheating.

Watch those rays! Some medical men still haven't gotten the word—at least when it comes to the dangers of radioactivity. They use X-ray machines without enough shielding, carelessly handle lethal materials such as radium.

In New York City, inspectors checked 1,200 X-ray machines in 100 hospitals, found that two out of three were spraying too much radiation around. During chest X rays, this faulty equipment irradiated the patients' sex organs 50 to 100 times more than necessary. (The big worry is this incidental radiation to the reproductive system, which can result in the birth of deformed or dead babies.) In Philadelphia, a survey found more than half the X-ray machines emitting excess radiation.

In Mexico City, carelessness on a really big scale turned up. For 15 years General Hospital stored a speck of radium inside an ordinary office safe, without the special shielding such deadly stuff requires. Last summer the entire two-story wing was found so hopelessly contaminated with dangerous radioactivity that it is being torn down and the debris buried.

Submarine automation. A 12-man crew would be enough for atomic subs (100 men are needed now) with a breadbox-size electronic computer the Navy is working on. It would give the skipper direct control over engine, weapons, communications, navigation.

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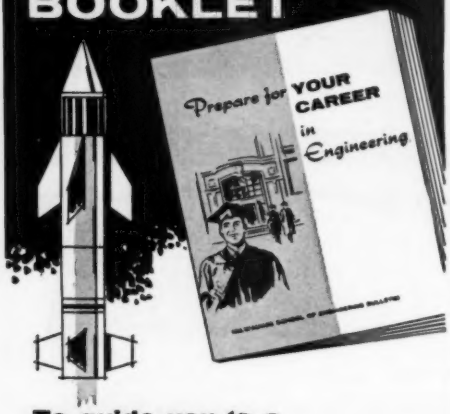

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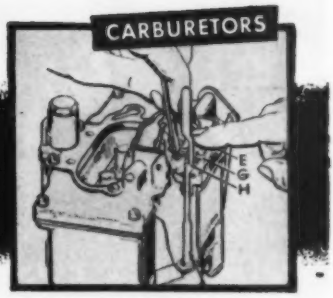

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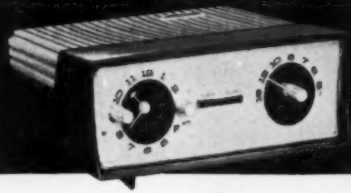

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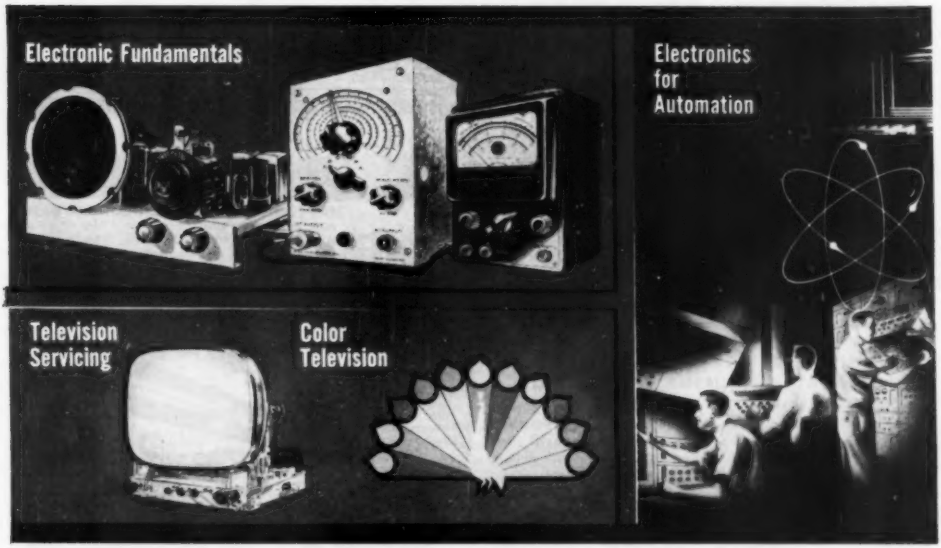

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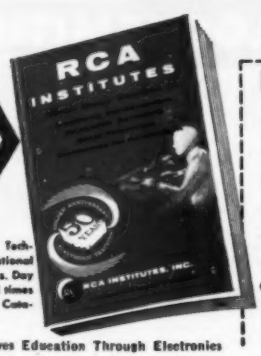

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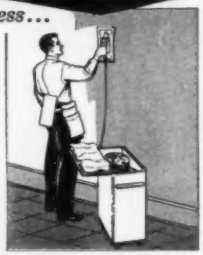

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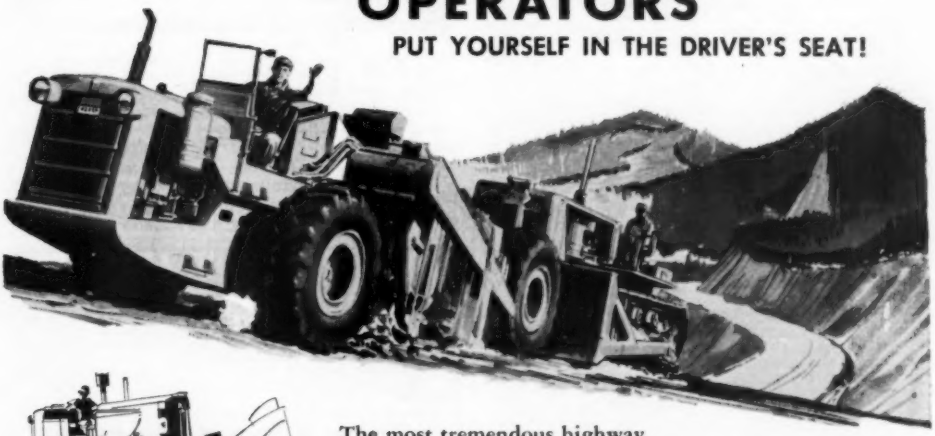

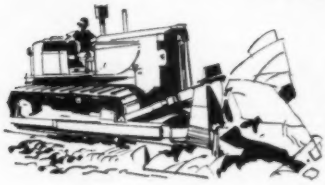

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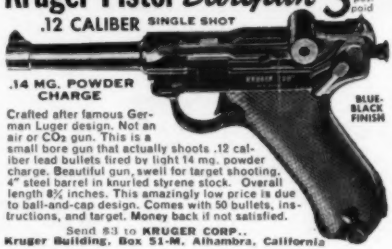

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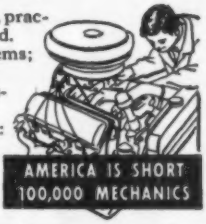

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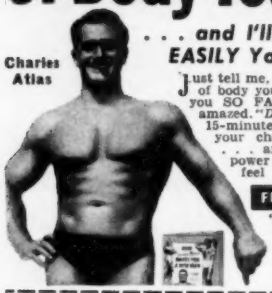

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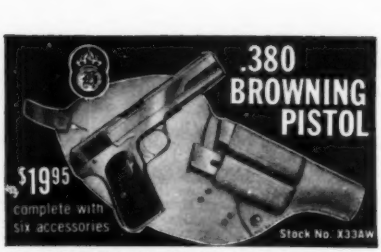

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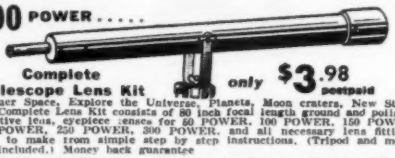

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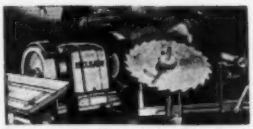

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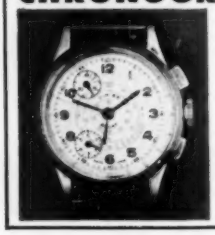

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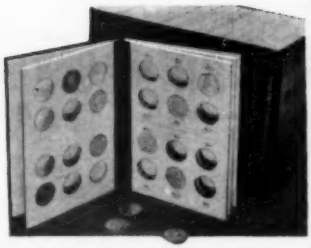

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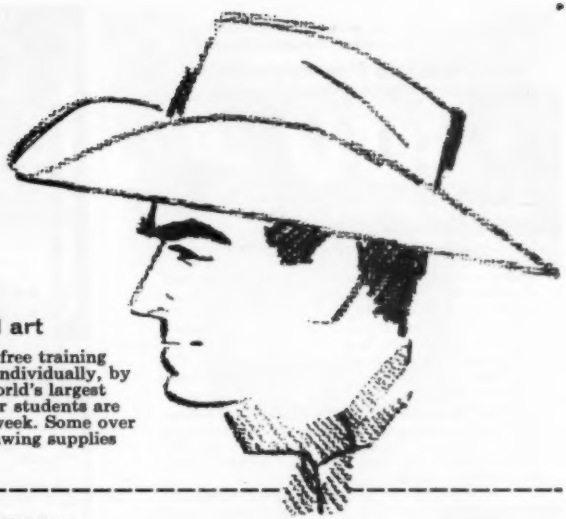

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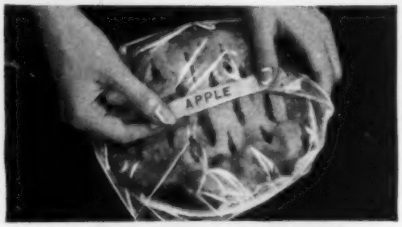

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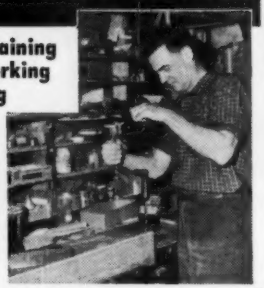

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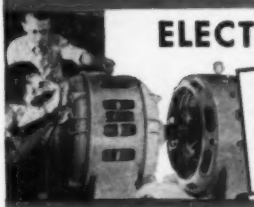

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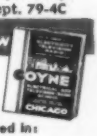

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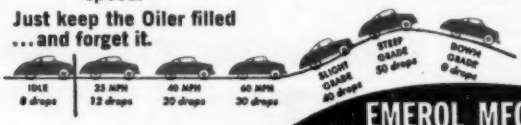

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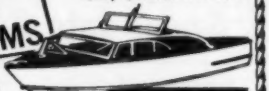

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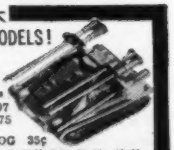

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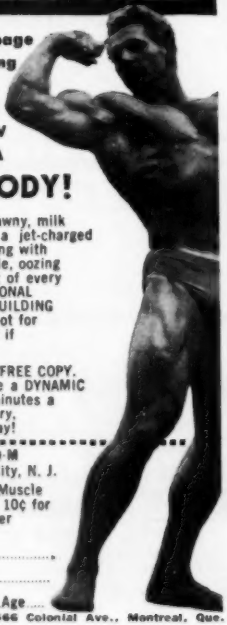

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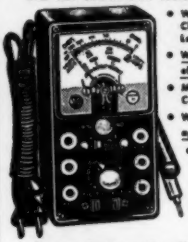

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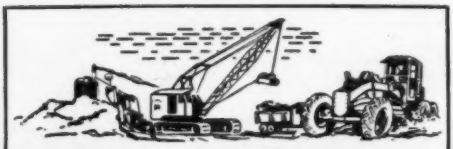

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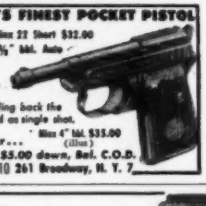

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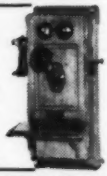

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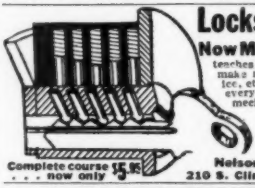

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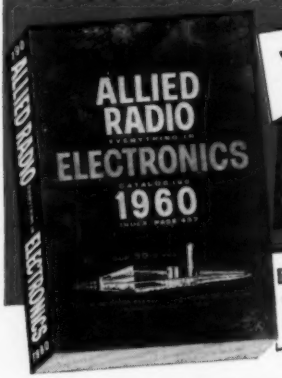

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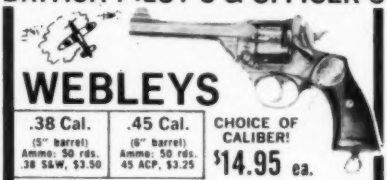

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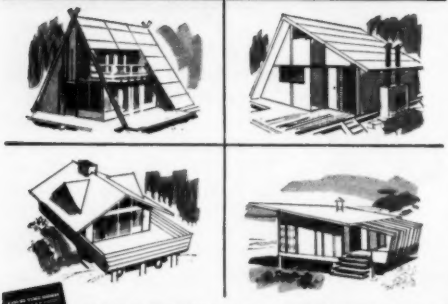

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DETROIT REPORT

By Ken Fermoyle *PS Detroit Editor*

Are Corvair Knocks Boosts?

Corvair "knocks" continue. Latest bit of "counterselling" by Chevy's competition that is circulating in Detroit: the gossip that engineers have deliberately detuned the Corvair engine. The idea, the rumors have it, is to keep fast drivers from getting into trouble on curves at excessive speeds. Oversteering, it's claimed, hasn't been licked. (See p. 114.)

These sources claim that the valve float point has been deliberately set at about 48 m.p.h. in second gear, well below the probable potential, for just this reason. Chevy people say only that the unusual degree of counterselling that Corvair has encountered is really a backhanded testimonial.

New tester checks plugs in car. A new lightweight instrument that can check spark plugs in a car, with the engine running, in less than three minutes has just been unveiled by Champion Spark Plug Company.

The device, a special-purpose oscilloscope that weighs less than 3½ pounds, is being sold to dealers, fleet owners, and service stations, and other users at a price of about $50. It can be hooked up quickly. Only four attachments are necessary: one to each of the battery posts; one to the center tower of either the distributor or the coil (whichever is more accessible), and the fourth to any plug cable. It gives a quick, accurate check on plug condition.

NASCAR studies compact car race. A 250-mile race for smaller U. S. sedans and comparable imported cars is tentatively planned for Speed Weeks at Daytona Beach, Fla., next February. Bill France and associates are studying the possibility of running such an event over the 3.8-mile sports-car road course of the new Daytona International Speedway. This course includes the high-banked track proper and a twisting infield circuit.

Right gas, oil, silence "rumble." General Motors Research Lab reports, after extensive investigation, that 10W-30 oils and fuels with phosphorus additives are most effective in quieting the rapping, low-pitched engine noise engineers call "rumble." These types of fuels and oils minimize combustion-chamber deposits which set off several "flame fronts" in the air-fuel charge—in addition to the normal ignition of the spark plug—when excessive pressure builds up in the chambers.

75hp STARFLITE II with Jetstream drive

Now the wraps are off! We invite you to share the excitement—to see, *try* the sensational new Starflite II—most efficient high performance outboard ever designed!

All the Performance Your Boat Can Use— Starflite II brings to boating entirely new concepts of speed and power, smoothness and reliability. Starflite power makes cruisers scamper like runabouts — Starflite-powered runabouts cruise serenely and economically at speeds other outboards strain to reach!

Outstanding New Features—New automatic choke, thermostat temperature control, new double-acting shock absorbers, new taper-lock transom brackets — history-making Jetstream Drive with full gearshift. All at no increase in size or weight—all at the lowest cost per horsepower in outboard history!

Preview Showing — 1960 Models — Seven pace-setting new 1960 Evinrudes at your dealer's now . . . including a fabulous new 40 hp Lark II. New colorful catalog—write: EVINRUDE MOTORS, 4227 N. 27th St., Milwaukee 16, Wisconsin.

JETSTREAM DRIVE BREAKS THE DRAG BARRIER!

Just as jet planes changed shape as greater power boomed them to super-sonic speeds . . . so has the Starflite II lower unit evolved into a new hydrodynamically designed shape. Jetstream Drive brings to well-designed runabouts the kind of performance formerly limited to lightweight raceabouts and single passenger hulls.

A Division of Outboard Marine Corporation
In Canada: Mfd. by Evinrude Motors, Peterborough

EVINRUDE

FIRST IN OUTBOARDS

GUARANTEED TO GO THRU ICE, MUD

and unmatched for whine-free,

Town & Country tires will GO through backroad

Only Firestone gives you this Guarantee plus Triple-Action Traction

On a country road or a city street, here's the pulling power you need for trouble-free winter driving. PULLING action! NON-SKID action! SELF-CLEANING action! You get winter-proved Triple-Action Traction *plus* Firestone Rubber-X, the longest-wearing rubber ever used in Firestone tires. Firestone Town and Country tires offer you extra miles of service—even over dry pavements. They're available in tubeless or tube-type S/F (Safety-Fortified) nylon or rayon cord, all-black or white sidewalls, in all sizes for American and imported cars. They're guaranteed to go through ice, mud or snow —or your Firestone Dealer or Store refunds your towing charge!

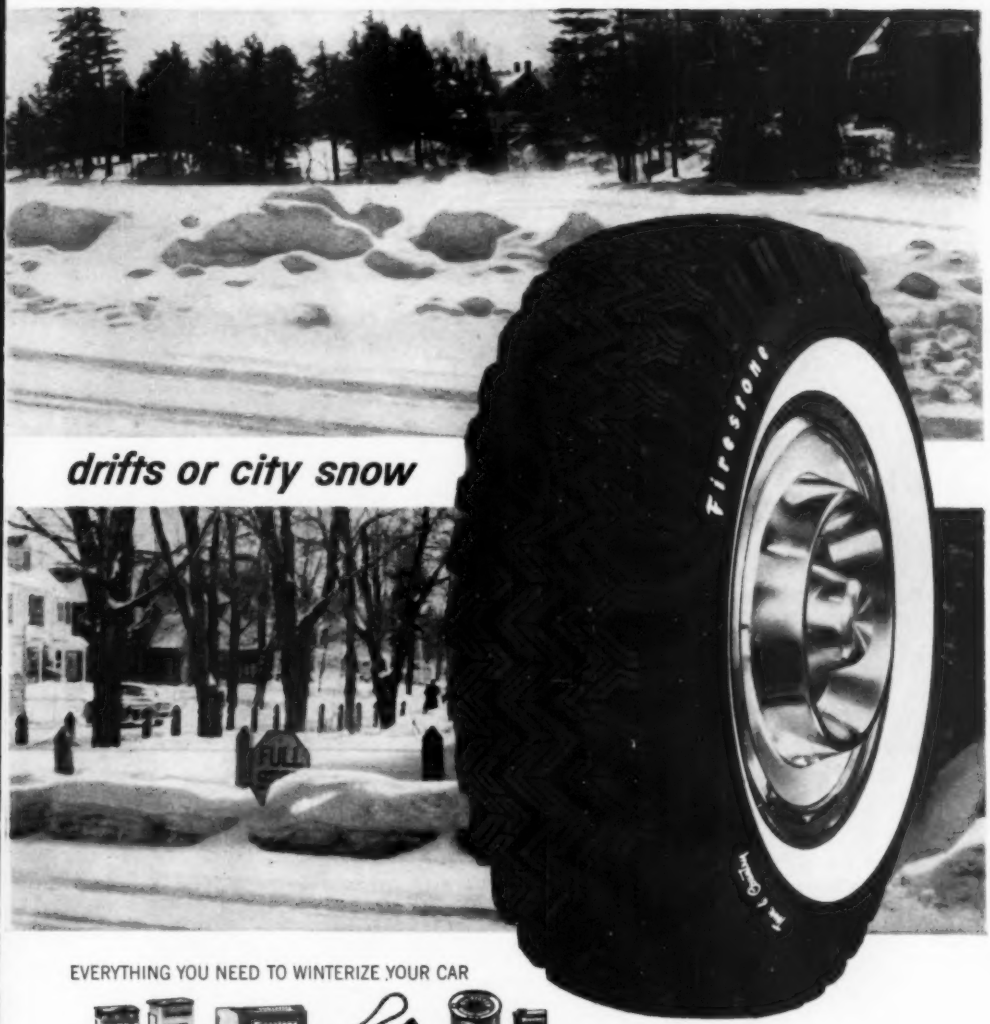
FIRESTONE HAS

Avoid starting worries this winter by installing a new Firestone Dri-Charge Battery in your car.

Save your battery this winter by installing a set of new Firestone, AC or Auto-Lite Spark Plugs.

OR SNOW OR WE PAY THE TOW!

dry-pavement mileage!



EVERYTHING YOU NEED TO WINTERIZE YOUR CAR

Protect your radiator with Firestone Frigitone, the permanent antifreeze, or Firestone Frigitol.

Good brakes are vital to safe driving. Firestone Matched Set Brake Lining assures you of safe stopping.

Before adding antifreeze, install new Firestone Radiator Hose and Firestone Fan Belt.

Firestone Speedy Cooling System Flush and a Firestone Oil Filter help protect engine.

Firestone

TOWN & COUNTRY TIRES

Copyright 1959, The Firestone Tire & Rubber Company

Get satisfying flavor...So friendly to your taste!

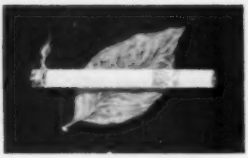
NO FLAT "FILTERED-OUT" FLAVOR!
NO DRY "SMOKED-OUT" TASTE!

© A. T. Co.

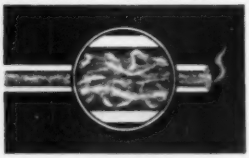
See how Pall Mall's famous length of fine tobacco travels and gentles the smoke—makes it mild—but does not filter out that satisfying flavor!

HERE'S WHY SMOKE "TRAVELED" THROUGH FINE TOBACCO TASTES BEST

1 You get Pall Mall's famous length of the finest tobaccos money can buy.



2 Pall Mall's famous length travels and gentles the smoke naturally . . .



3 Travels it over, under, around and through Pall Mall's fine tobaccos!

Outstanding . . . and they are Mild!

Product of The American Tobacco Company — "Tobacco is our middle name"

POPULAR SCIENCE
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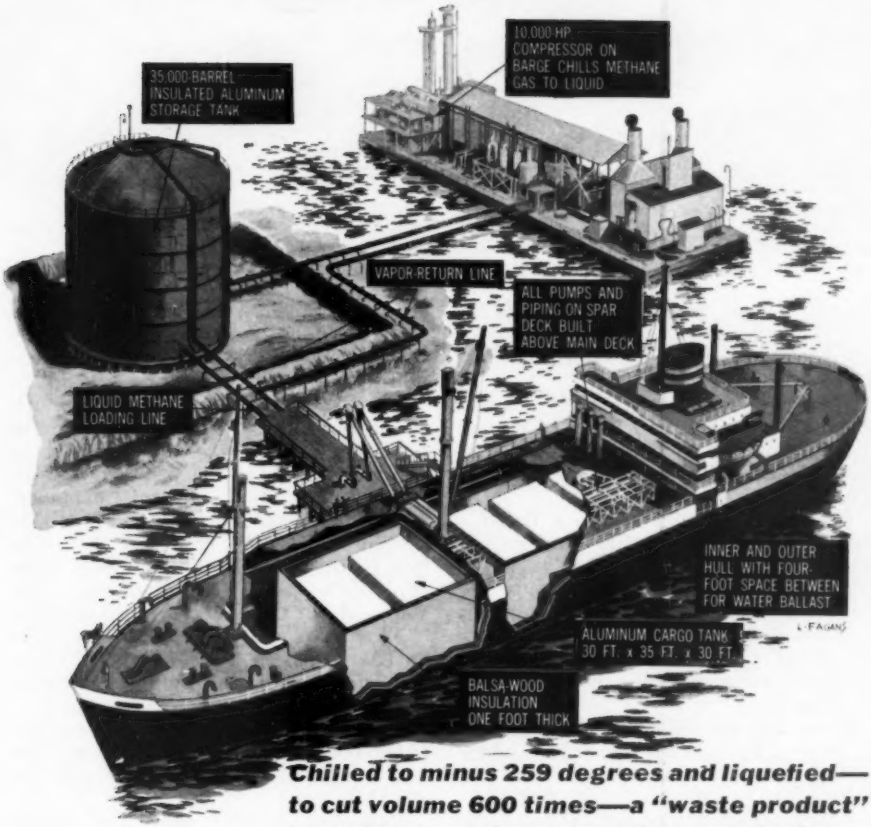
Strange New Ship Hauls Cooking Gas



Chilled to minus 259 degrees and liquefied—to cut volume 600 times—a "waste product" becomes a precious cargo for supertankers

By David X. Manners

A NEW kind of ship, loaded with a cargo unlike any ever transported before, slipped quietly out of a Louisiana port this year. Its crew of 30, plus a team of six design and test engineers, were off to prove a point. Liquefied methane, they believed, is not the perilous, highly explosive cargo it's popularly supposed to be—no harder to handle than regular gasoline. If the voyage proved successful it would revolutionize the oil and gas industry.

The rich oil fields of Venezuela, Algeria and the Near East prolifically produce, besides oil, the natural gas that fuels kitchen stoves. In those places there's no use for it. Yet countries such as England, Germany and Japan are

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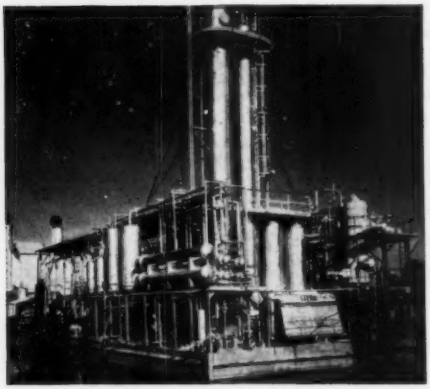
For the coldest cargo ever: a giant chiller-on-a-barge



REFRIGERATION PLANT, built on barge so it can be floated from well to well, cools methane gas to liquid (at minus 259 degrees) in six stages.

EARTHEN DIKE would stop spread of methane, which can explode with disastrous effect, in case tank storing the liquid should leak.

starved for gas. Pipeline connections are out, so this gas, by the millions of dollars' worth, has been wasted—burned off at the wells.

If methane were converted to a liquid, it would be reduced to 1/600 of its volume. It could then be hauled in ocean-going tankers, just like oil or gasoline. That's fine, except . . .

Compressing methane into a liquid—the way other gas fuels like propane and butane are handled—looked hopeless. It takes a pressure of 9,000 pounds per square inch. Chilling methane until it condensed to liquid seemed no more promising. The temperature of liquid methane (unpressurized) is 259 degrees F. below zero!

Foray into the unknown. Still, it might be done. The impetus came first, oddly enough, from the Union Stock Yard and Transit Co. of Chicago (which was looking for a cheap way to get gas fuel from wells it owned in the Southwest). Continental Oil joined in, forming Constock International Methane, Ltd. Led by Continental's John A. Murphy, the new organization bet on refrigeration.

What kind of a tank could hold a liquid like that? What metal wouldn't give way under the effects of the sub-zero temperature, the pounding of rough seas? And how could the liquefied gas be refrigerated on the ship?

If 259 below is the point at which methane becomes liquid, it's also the point at which it again becomes a highly combustible gas. What could be done with that gas? It couldn't be kept in the tanks. They'd blow up from the pressure.

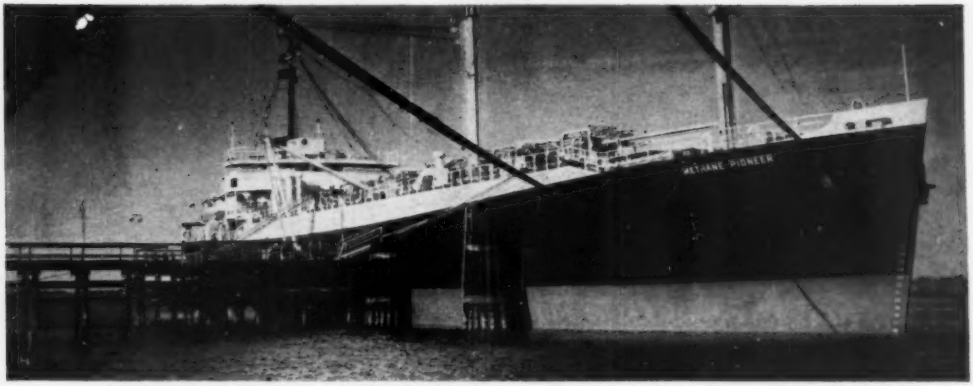
Engineers had studied classic methane accidents such as the 1944 disaster in Cleveland, when methane spilled into the streets and sewer system, exploded, burned over 50 blocks and killed 135 people. They were confident they now had all the answers. The one way to be sure was to build a test plant and a test ship and put their theories into practice.

Four years ago, pilot operations began at Lake Charles, La. A $3,000,000 refrigeration plant was built on a barge. It was made mobile so it could be moved to service different wells. For another $5,000,000, a cargo ship was converted into a refrigerator tanker for carrying the erstwhile gas.

Ballasting against bob. The tanker posed many problems. Because methane is only half as heavy as water, special ballast had to be provided so the ship wouldn't bob on the waves like a cork. It was contrived by building two separate steel hulls, one inside the other, and four feet apart with water between as ballast.

A new kind of insulation had to be found. There was the possibility that methane spilled on the water might ignite and envelop the ship in fire. John Murphy found the answer in the jungles

and balsa-lined tanks in a double-hull ship



FIRST OF FLEET, the Methane Pioneer carries five aluminum tanks, which are heavily insulated with balsa wood but are not refrigerated. It delivers cargo before more than a small fraction boils away. Gas that does boil off is vented through tall stacks into the atmosphere.

of Ecuador—foot-thick balsa wood. Balsa will burn, but in big chunks it won't do more than char even if you hold a blowtorch on it. Oxygen can't get inside the wood to support combustion. As an insulator, balsa is better than fair.

Five tanks, to hold 35,000 barrels of methane, were made of half-inch aluminum plate (aluminum doesn't become brittle at extreme cold). But just in case the metal did rupture, the balsa insulation around it was leakproofed with special joints and a secretly formulated covering. The very nature of liquid methane helps prevent leaking. If the liquid penetrates the balsa, it warms, turns into gas, and the gas drives further liquid back out.

To waste least space, the tanks were built square. They were not fastened down, because they would expand and contract three inches with temperature changes. They were merely keyed into the balsa with metal projections, and the balsa reinforced at these points.

Keeping oxygen away. Methane can't burn unless it has oxygen. To keep air from around the tanks, they were surrounded with incombustible nitrogen gas. The tanks, too, were precooled, before filling, with liquid nitrogen. The nitrogen displaced all air from the tanks so a combustible mixture of methane and air would never be present at any time.

The tanks didn't have to be mechanically refrigerated, since the liquid methane kept itself cold by boiling gently on the surface. The heat for continuous boiling was taken out of the liquid, thereby keeping it cold.

The boiled-off gas was carried out of a vent pipe rising high above the ship. This loss came to only a fraction of a percent per day. But theoretically, if the ship were delayed enough in transit, it could lose its entire load.

Last January 28th the newly christened Methane Pioneer was loaded and ready to sail. It pulled cautiously away from the dock. Instruments and gauges kept constant check on temperatures, pressures and anything else that might be the first clue to impending disaster. An infrared analyzer continuously monitored the gas composition in the insulation space to detect leaking methane. If it did, it would sound an alarm. A series of thermocouples attached to the sides and bottom of the ship's inner steel hull were ready to warn of a sudden temperature drop that might crack the metal.

Trial by lightning. The Pioneer started slowly. It speeded up to 11½ knots. Then it ran into rough weather and the real test was at hand. Would the welds hold? (Every seam in the five tanks had been X-rayed for faults.) Could lightning strike a fire? (Steel-hulled ships, nearly perfectly grounded, are usually immune to

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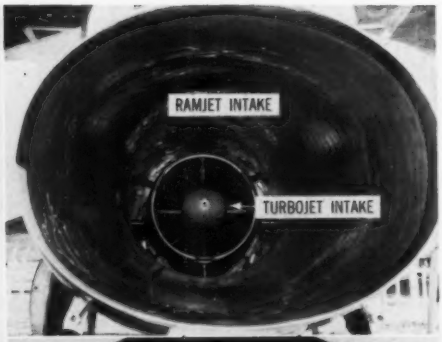
PS Picture News



JET WITHIN A JET. The dual engine of the French Nord Griffon II has a turbojet engine in the center. Built around it is a ramjet engine (photos at right). The "flying stovepipe" ramjet takes over at high altitude and supersonic speeds. The pilot's cockpit is mounted above the gaping common air intake (upper left) and has its own delta tab wings. A research aircraft, the Griffon recently flew more than twice the speed of sound on its ramjet engine.

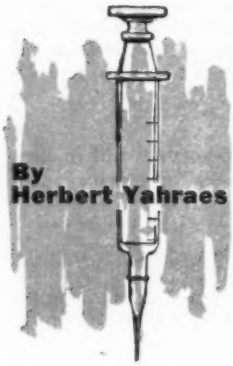
ELECTRIC HEATING. The "fireplace" in this British home is a movable, plug-in panel. The board, of fiberglass saturated with graphite, was developed from a method of heating jet-plane components.

STRADDLE STACKER. This new "van carrier" drives over trailers or railroad flatcars to pick up or load big cargo containers. A built-in hoist enables it to stack one on top of the other.

In a New York hospital, a narcotics addict goes through misery as he tries to "kick the habit."

What every young man should know:

The Tragic Truth About Taking Dope



By Herbert Yahraes

A PERSON who has become addicted to narcotics is one of the most miserable of all human beings.

He brings his family shame and anguish. He finds it increasingly difficult to get any real joy out of life. He no longer gets even a temporary kick from dope-taking. He is likely to wind up among underworld characters—or in prison. He suffers, really suffers, physically.

Some physiological processes and personality problems involved in the tragedy of drug addiction are just now beginning

CONTINUED

to be understood. Here is a summary of what the doctors know today:

What happens at the start of the habit?

When a dope-taker sticks the needle under his skin for the first time, he gets much the same effect from morphine or heroin as from a cocktail on an empty stomach. His troubles seem pushed back. The world looks good.

In half an hour he grows drowsy. An electroencephalograph would show a brain-wave pattern characteristic of the first stages of sleep. He wakes up suddenly, drifts away again. Drug addicts say he is "on the nod."

Now occur those opium dreams. They aren't wildly beautiful, however; they are made of the same stuff as his daydreams. Narcotics simply help the dope-taker to indulge in his usual fantasies. These effects are caused by deep-seated depressant actions on the brain and nervous system.

He also breathes a little slower. His temperature and blood pressure fall a little; his eyelids slightly droop; and he blinks less often—all the result of minor depressant actions on his autonomic, or involuntary, nerves. Somewhere along the line, since this is his first experience with narcotics, he may get sick to his stomach.

The effects wear off gradually, in three or four hours.

Is it different once a man is "hooked"?

The veteran dope-taker, seeking a swifter kick than that supplied by an under-the-skin injection, jabs the needle into a vein. In seconds the blood vessels in his skin dilate, his face flushes, and his nose may itch. Soon he has a feeling in his abdomen that addicts call a thrill. They say it's a little like a sexual orgasm.

The thrill passes in a few minutes and the symptoms become the same as with a subcutaneous dose. The addict says at this stage he is "fixed"—meaning that he has satisfied his craving for a while and is feeling no pain.

A person under the influence of heroin, morphine or a similar drug appears quite normal. Since he is often an anxiety-ridden person to start with, he may, in fact, seem more nearly normal with the drug than without it. As long as he hasn't taken enough to make him sick, most people aren't likely to notice the signs that he has taken any.

Can an addict perform skilled work?

Experiments at the federal drug-addiction hospital in Lexington, Ky., have shown that even persons "on the nod" will

This article is based on information obtained from interviews with—or scientific publications written by—the following authorities:

Kenneth W. Chapman, M.D., assistant director, Clinical Center of the National Institutes of Health; and formerly director of the United States Public Health Service Hospital (for drug addicts), Lexington, Ky.

Harris Isbell, M.D., director, National Institute of Mental Health Addiction Research Center, Lexington.

James V. Lowry, M.D., formerly medical

of utter misery, twitching, vomiting, diarrhea—and terror

quickly rouse themselves when asked to do something and will do it with their customary skill. They may do it a little less speedily than usual, and on psychological tests they score a little lower than usual. But, states a report to the *American Journal of Medicine:* "If a sufficient supply of the drug is available, the overt behavior of the addict is not unusual and he can carry on a highly skilled technical occupation in a fairly satisfactory manner."

"These drugs," one authority emphasizes, "do *not* impair a person's reasoning ability."

So what's so bad about taking narcotics?

A great deal. One trouble is *tolerance*. Sooner or later the dope-taker can't get "fixed" unless he increases the dose.

For the non-addict the usual dose of morphine is a quarter of a grain—about one-twentieth the size of an aspirin tablet. Its effects last a few hours. To recapture them, people taking a narcotic regularly have to double the dose in a matter of days. Soon most of them have to increase it again, and then again, and again. There is a case on record of an addict who in 16 hours took 78 grains.

Even in big doses, short of the poisoning level, the drug apparently does no direct physical damage. It allays hunger, however, so the addict may become malnourished. And, since it relieves discomfort and masks pain, he may become seriously sick without knowing it.

Further, he has to spend more and more time looking for the drug and less and less time working. Somewhere along the line, then, he may be edged into criminal activities because they seem the only answer to his financial problem.

(Do narcotics make people criminal? No. But many criminals do eventually take dope, and many dope-takers do eventually become thieves, racketeers or confidence men to support their habit.)

As time goes on, the addict is likely not only to need more of the drug but to need the drug more. This dependence is partly emotional. He uses the drug to dissolve his problems, and the oftener he turns to it for this relief, the stronger its hold on him.

Is drug addiction believed to be mental or physical?

It used to be thought that the whole process of dependence was "in the head." But researchers have piled up proof that the drug definitely changes body chemistry. For example, certain reflex actions in the legs of animals are stronger than usual when the animal has been given morphine.

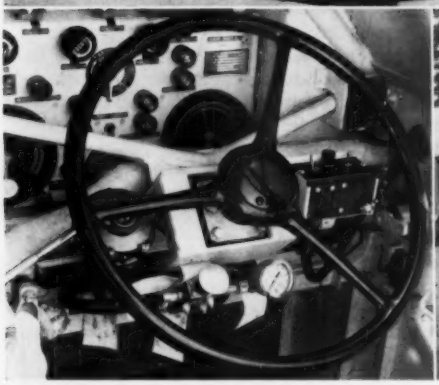
[*Continued on page 256*]

officer in charge of the Public Health Service Hospital, Lexington.

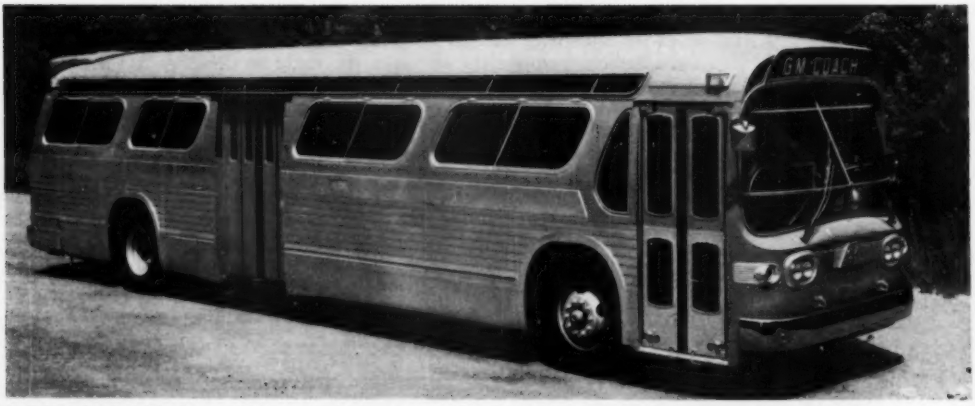
Lawrence Kolb, M.D., formerly director of the hospital at Lexington and formerly in charge of the Division of Mental Hygiene, now the National Institute of Mental Health.

Walter M. White, M.D., of the hospital at Lexington.

Abraham Wikler, M.D., chief, Neuropsychiatric Section, National Institute of Mental Health Addiction Research Center in Lexington.



BACK-SEAT DRIVERS. Goodyear's new 80-foot Atlas carrier (top) requires two co-pilots. They sit, one on each side, in low-slung cabs (above, right) just ahead of the big four-wheel rear trucks. Like the tillerman at the back of a hook-and-ladder, each has his own steering wheel (left) to control the rear wheels when turning corners. Each can see only on his own side, keeps in touch with his partner and the driver in the cab up front through an intercom system.



STYLISH BUS. Here's a new bus for city streets that's streamlined to look like a cross-country cruiser. Slanted windows slide horizontally to open, and high transoms let standees watch for stops without bending. A 25½-square-foot wind-

CROW'S-NEST. This restaurant, built like a lookout on the mast of a ship, soars 320 feet into the sky at Rotterdam, Holland. It will open next year and give patrons an unusual view of one of Europe's leading harbors while dining.

SELF-RAISERS. Hydraulic screw-jacks in the hatch-hinges above lift the covers in 30 to 60 seconds on a new Swedish ship. Lifting mechanisms occupy no cargo space, don't get in the way.

DRIVING IN THE DARK. Infrared binoculars convert heat into light electronically to let soldiers see and drive during blackest blackouts. They respond to normal heat which all objects—even inanimate ones—always give off.

shield (above) gives the driver a full view of the street ahead and to the sides. A new V-6 diesel engine powers the air-conditioned bus. GM is making it in four models with capacities of 45 to 53 passengers. Better mileage is expected.

Firemen Burn a School—to Save Children's Lives

Los Angeles firemen set 60 blazes in an outmoded schoolhouse to learn how to protect children in other buildings like it

By Wesley S. Griswold

YOUR town probably has a school like this: 40-odd years old, two or three stories high, but solid and pleasant, its spacious rooms essential for ever-multiplying classes. There are thousands like it across the U.S.

Fire experts call it the most hazardous type of school building.

The tragedy latent in its wood-joisted floors and upper-story classrooms burst upon the nation last December. Within a few minutes flame and smoke swept Our Lady of the Angels School in Chicago. Ninety children and three teachers died; 77 others were badly hurt.

Spurred by this disaster, the Los Angeles Fire Department has now shown how to make such old schoolhouses safe. The fire fighters found out by becoming fire bugs. Methodically they set fire 60 separate times to Robert Louis Stevenson Junior High School (abandoned because of weakened foundations).

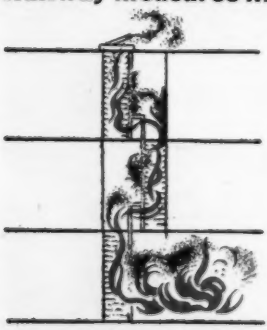
The test blazes proved that there is only one *sure* way to protect the children:

Equip every aging, multistory schoolhouse with a complete, automatic sprinkler system. Rig it so that the instant a sprinkler head goes into action, it will start alarm bells ringing. Then the vital decision on whether or not to evacuate the schoolhouse won't be left to human judgment.

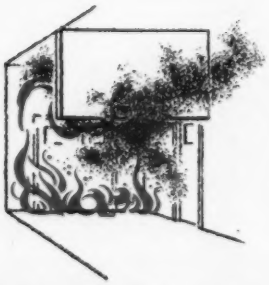
In the dreadful Chicago fire, a fast-moving blaze was given 17 fateful minutes to spread between the time two children reported smoke in the basement and the time that the school alarm was sounded and the firemen summoned.

The Los Angeles test fires revealed one other dependable safeguard: Install an automatic fire-detection system, set to

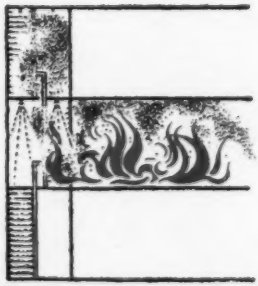
Halfway measures like these won't save lives



VENTED STAIRWAYS proved disappointing. Experiments showed that they were little help in keeping smoke and heat to tolerable levels inside rooms.



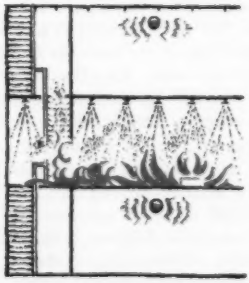
DRAFT CURTAINS—partitions erected across corridors—retarded the spread of intense heat, but didn't stop smoke. Smoke is the dangerous killer.



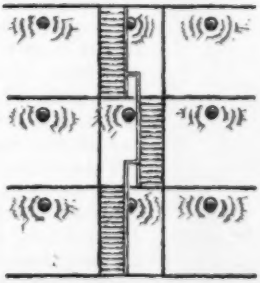
PARTIAL SPRINKLER system, like draft curtains, failed to provide full protection. It kept heat under control, but had no appreciable effect on deadly smoke.

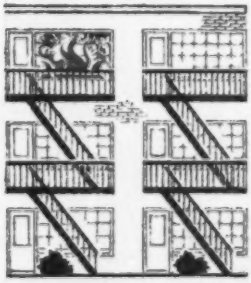
HUNTING FOR EMBERS after putting out first schoolroom fire of Los Angeles test series, firemen check results. In later tests, stacks of pallets replaced wood chunks for "standard fire."

There's one sure safeguard—but it's expensive



COMPLETE SPRINKLER system guarantees safety, tests indicate. It would control both smoke and heat, simultaneously sound alarm. Cost: $10,000-plus.





ALTERNATE METHOD requires both automatic alarms, sensitive to heat and smoke, and direct exit to outdoors from every classroom. Only both could get children out of burning school fast enough to escape alive. In Los Angeles tests, unchecked basement fire made some classrooms death chambers within *two minutes*.

CONTINUED

1958 Chicago tragedy—93 dead, 77 hurt—spurred program

PREPARING FOR A BLAZE in the Stevenson School, technicians check wiring of thermocouples (which record temperature rise) and get ready to ignite a weighed amount of dry wood.

INSTRUMENTATION ROOM in the outmoded school registered temperatures on all three floors during test fires. One big panel (above) kept tabs on a new smoke-density alarm system.

THICK BLACK CLOUD pours from classroom during one test. It shows graphically why most victims are killed by smoke rather than heat—and why safeguards must control both dangers.

sound the alarm when it senses smoke or a sudden, dangerous rise in temperature. *But*—for full protection, every classroom must have an outside exit.

Every other conceivable protection was tried out—separately and in combination—during 2½ months of starting and dousing blazes. Among them:

- Automatic vents, regulated by heat and smoke.
- Fully enclosed stairways.
- A partial sprinkler system.
- Automatic draft curtains in stairwells and corridors.
- Smoke barriers in corridors.

For saving lives, *they were all found to be practically useless.*

That is the preliminary report of Deputy Chief Raymond M. Hill, Fire Marshal of Los Angeles, who was in charge of the unique experiments.

How to burn a school. The 34-year-old Stevenson Junior High, which was made a fiery sacrifice to the cause of children's safety, was an ideal candidate for burning.

The three-story, 30-room structure had a brick-and-concrete exterior. Its corridors and stairways were of concrete, lined with hollow clay tile. Classroom floors, partitions and roof were wood.

Since it was due to be razed, the Los Angeles Board of Education offered it for use in fire-spread and fire-fighting tests. The Ford Foundation provided $25,000 to help finance the experiments. Interested business firms contributed $75,000 in services and materials.

Deputy Chief Hill and his picked crew of fire-spread investigators set aside one wing of the school for their work. They sealed it off by building partitions in the corridors. They then had, in effect, a three-story schoolhouse 65 by 95 feet, with two open stairways, one at each end; one outside fire escape; and a small basement.

This laboratory was studded with devices for measuring temperatures, smoke densities, oxygen and carbon monoxide. Two firemen were stationed on each floor during every test fire. They didn't wear masks. They were there to determine the moment when smoke became too thick, heat too intense, for a child to endure. Their reactions were compared with the instrument readings after each fire.

to measure dangers of old schoolhouses and find cures

BASEMENT FIRE in Chicago school before Christmas last year sent heavy smoke and intense heat racing up stairway to fill second-story classrooms and block the children's escape.

CHARRED CORRIDOR testifies to searing temperature generated by tragic blaze. Wood-joisted floors burned through. Delay in sounding alarm —17 minutes—was a big factor in disaster.

For the 60 blazes, Hill and his team established a "standard fire": 1,400 pounds of wooden pallets, heaped in two or three piles and set afire by two match-lighted cotton-and-gauze igniters. This burned neither too fast nor too slowly. It reached peak intensity in 12 to 15 minutes. At its height, the fire produced 560,000 BTUs of heat per minute —a bit less than the searing blast from one fully blazing classroom.

Five fires were allowed to burn to peak intensity. This provided a baseline against which control measures were compared.

The results were hair-raising.

Holocaust in minutes. Some of these unrestricted fires were set in the basement, at the foot of a stairway. Their smoke routed firemen from the ground floor within two to three minutes. It drove other firemen choking and weeping from the second floor in about four minutes, and from the third floor within six minutes.

Smoke is usually the principal killer. Then comes heat.

The experimenters had decided that a temperature of 150 degrees five feet above the floor was the limit that a schoolchild could tolerate. (After a few light roastings, the firemen guinea pigs argued for a 135-degree limit.)

Heat from uncurbed basement fires made the first floor of the Stevenson school unbearable within five to seven minutes. The second and third floors got too hot in eight to 11 minutes.

Within 15 minutes, temperatures on the first floor ranged up to 600 degrees, on the second to 300 degrees, on the

[*Continued on page 238*]

AN EXPENSIVE LESSON to city of San Francisco was the $1,000,000 fire that swept the Jefferson School there last Memorial Day weekend. The aging school had no automatic sprinklers.

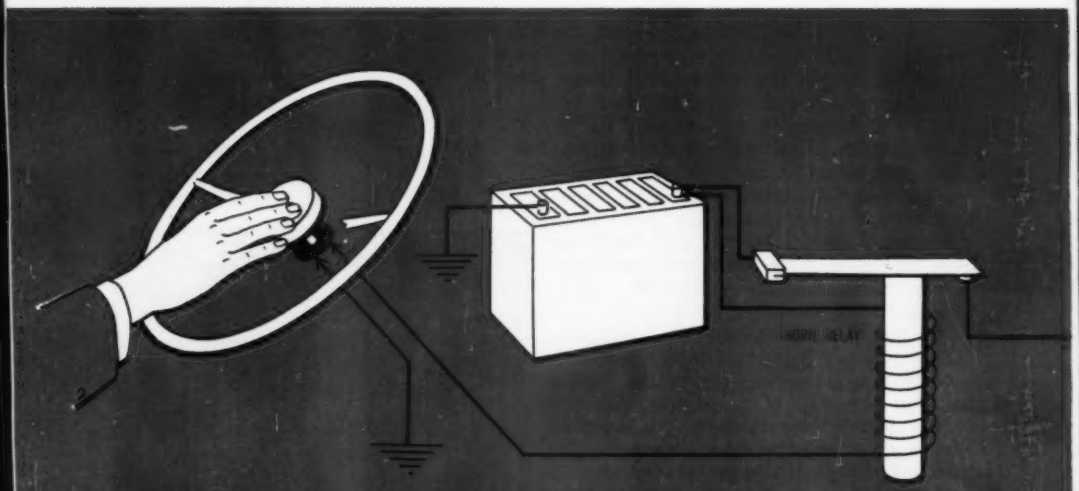
How an Auto Horn Works

AN AUTO horn is a musical instrument, sort of, that's played electrically. American cars usually have two: one tuned to E flat (311 cycles per second) and the other to G (392 c.p.s.). When you press the button, out comes the most common interval in music—the major third.

No rules forced the horn makers to agree on the notes. They've tried many. But experience since 1933, when the "sea shell" horn came out, indicates that these frequencies are the best compromise. A variation of only 2½ c.p.s. is allowed. Below 311, a horn vibrates its mounting bracket enough to loosen it. Above 392, the vanadium-steel diaphragm would have to be so thin that accurate manufacture would be difficult.

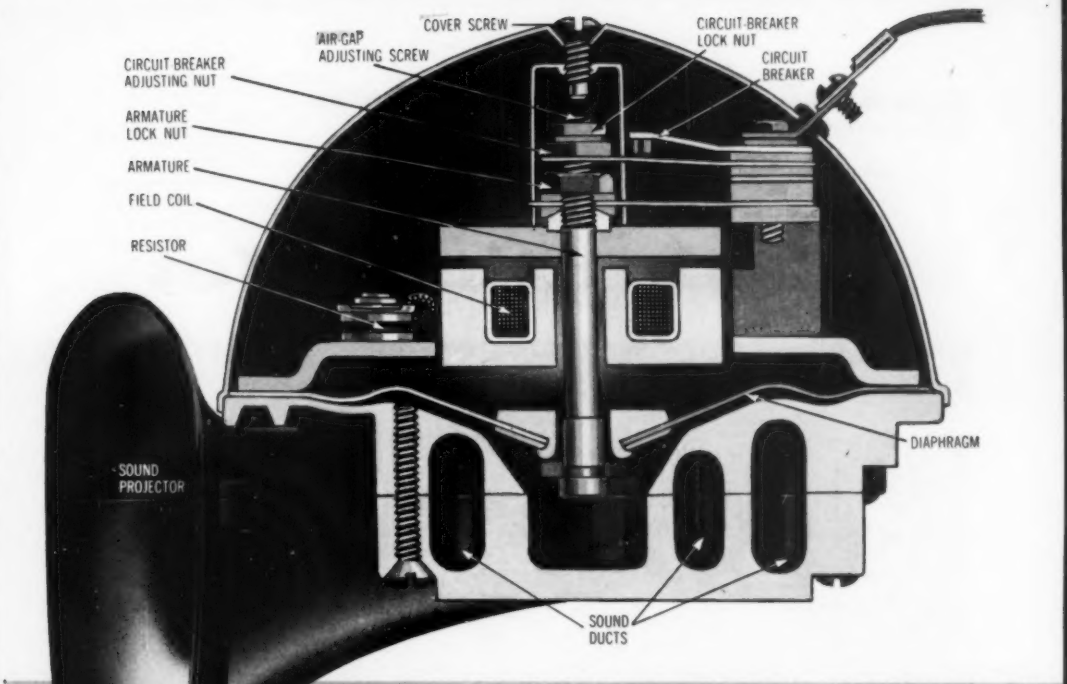
Horn manufacturers are still looking for a better way to produce sound. If cars had compressed air they'd probably be fitted, like trucks and diesel trains, with air horns. This type is louder without offending human ears. For penetration, say experts, frequency and distinctiveness count more than loudness.

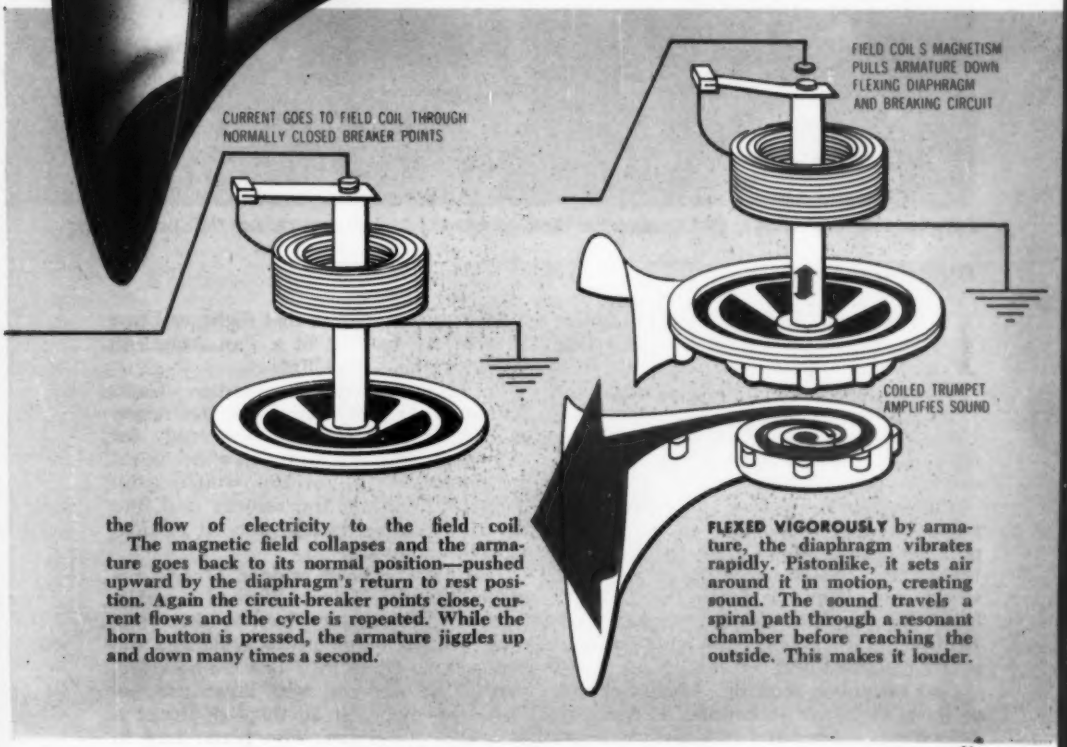
The horn makers worry about turnpike users overdriving their horns. At 65 m.p.h., they say, a signal may be heard only one to two car lengths ahead.—*Erik H. Arctander.*



WHEN YOU PRESS THE HORN BUTTON, current from the car battery flows through the coil in the horn relay. The coil magnetizes its iron core and pulls down the armature, closing a set of electrical contacts.

Now current flows from battery to horn by way of the relay contacts. Inside the horn, current flows through the circuit breaker (whose points are normally closed) to the field coil of the electromagnet. Energized, the magnet pulls the armature down sharply—thereby flexing the diaphragm attached to the armature's lower end. The movement at the same time snaps the circuit-breaker point attached to the armature's upper end out of contact with its mate. This opens the horn circuit, momentarily cutting off



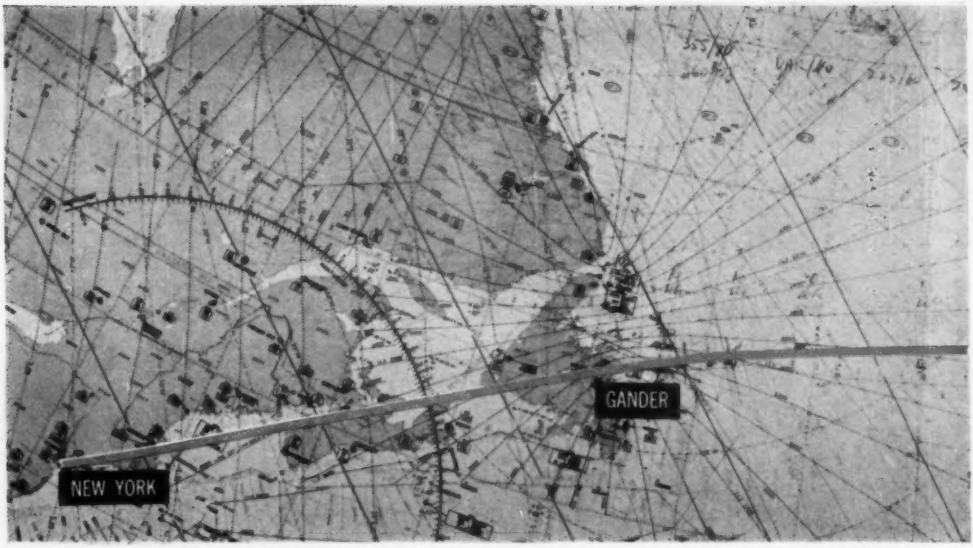


the flow of electricity to the field coil. The magnetic field collapses and the armature goes back to its normal position—pushed upward by the diaphragm's return to rest position. Again the circuit-breaker points close, current flows and the cycle is repeated. While the horn button is pressed, the armature jiggles up and down many times a second.

FLEXED VIGOROUSLY by armature, the diaphragm vibrates rapidly. Pistonlike, it sets air around it in motion, creating sound. The sound travels a spiral path through a resonant chamber before reaching the outside. This makes it louder.

Come into the cockpit of the world's fastest airliner to see what it's like when you are

Flying the Atlantic by Jet



In planning the flight, the dispatcher had probed for soft spots in the prevailing

By Devon Francis

IN THE past year, jet airliners under the American flag carried 150,000 passengers across the Atlantic.

The jet is a new kind of flying machine. It makes the 3,250 miles to London from New York in 6½ hours. Between one day's dawn and the next, it can cross the ocean twice.

Its engines gulp fuel at more than twice the rate of piston engines. For a nonstop ocean crossing, its fuel load at takeoff can weigh more than a whole workhorse airliner such as the DC-6B. So every flight is reduced, simply and irrevocably, to pounds of weight. To that, and to minutes and seconds.

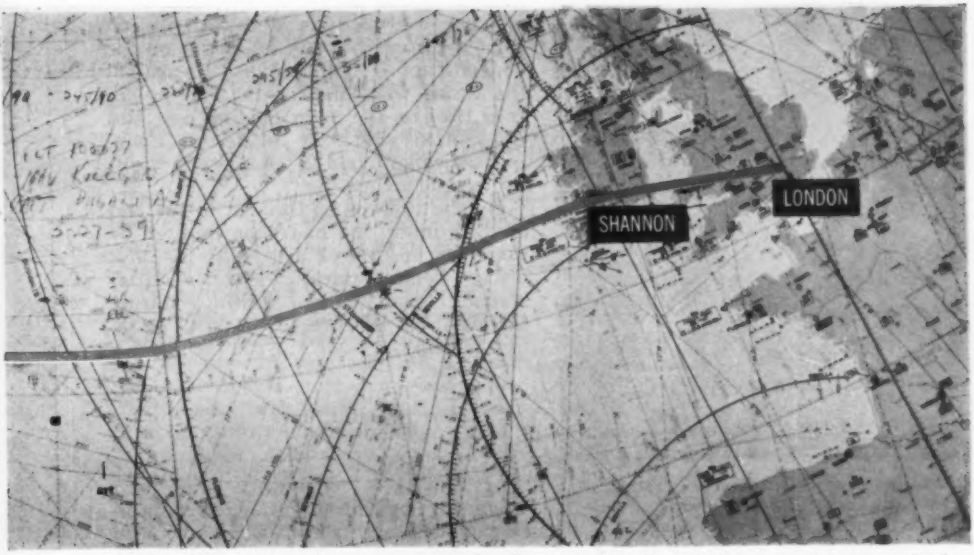
One afternoon recently, I boarded one of these airplanes at London Airport for New York.

Here is the story of that flight, as I saw it from the cockpit of a Pan American World Airways Jet Clipper:

On this sunny Wednesday, Capt. Arthur J. Dugan, sitting on the downwind lip of the runway, was ready for takeoff. He knew exactly how he would get westbound Flight 103, weighing almost 120 tons, off the runway and into the air. He already had done it meticulously—on paper.

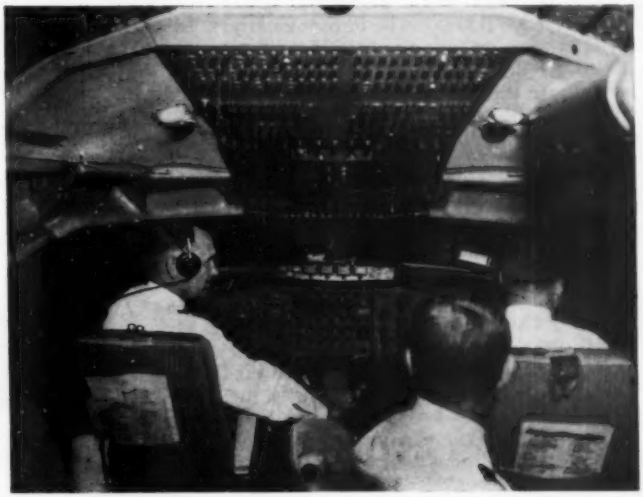
The total takeoff weight of his airplane, more than twice that of a piston transport, was rigidly fixed by three factors—ground temperature, wind and the necessity to climb fast. The temperature, now at 63 degrees, was important because the higher it is, the less thrust a jet engine produces. The plane had to

The climb-out, leaving a wake of four streamers of black smoke, caused by water injection, was rapid.



westerlies. The route chosen was not the shortest, but the winds were of lower velocity.

Winging out over the open sea past Shannon, at an altitude of seven miles, the flight-deck crew relaxed into familiar routine, laced with small talk. Clipper was four minutes behind schedule. Engineer Paul Eckhardt studied his engine temperatures and rate of fuel flow. Capt. Dugan and his first officer checked Eckhardt's figures.



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gain altitude fast because London, like New York, has regulations to minimize jet sound on suburban eardrums.

Today a crosswind of 10 knots amounted to a condition of no wind at all. The gross weight became a simple matter of arithmetical put-and-take. The traffic department wanted some 27,000 pounds of

Blonde Mary Chugkowski glanced at her watch. She had a date this evening 3,000 miles away.

payload aboard—111 passengers, baggage, cargo and mail. The gross could not exceed 237,560 pounds. Paradoxically, the only way to get this off the ground was to use 4,400 pounds of water for injection into the engines.

For two minutes, the water would add bulk—and therefore thrust—to the gale jetting from the tailpipes. It would also cool the engines, allowing the use of more fuel—meaning more thrust—within the 1,148-degree tailpipe heat limit.

Arithmetic of bulk. With a plane weight of some 119,000 pounds, that left 86,900 pounds of fuel. This was about 13,166 gallons, though Capt. Dugan figured it only in pounds-per-hour consumption. It would give him an "endurance" of seven hours, nine minutes in the air. If the trip had been eastbound, in a "jet stream," the plane might have added as much as 200 miles an hour to its normal 575-m.p.h. cruising speed. Westbound, it had winds to buck. They would force Flight 103 to refuel at Gander.

Dugan scribbled his computation on the number of seconds it would take to reach a takeoff speed of 100 knots. It came to 30. His first officer, C. N. Warren, figured his separately—31. That was close enough. This innocent-looking ritual was vital to a safe takeoff technique.

When everybody was aboard, Dugan started his engines. An attendant on the concrete apron stoppered his ears against the whine with his fingers. The nylon-cord tires on the main landing gear had flat-spotted while the plane sat there, and the captain had to put on extra throttle to get moving.

By the time he had taxied to the end of the runway, he had gone through 54 items on his check list with his first officer—before starting engines, after starting them, before taxiing, during taxiing. Now he covered the last six before takeoff.

"Traffic?"

"Clear."

"Turbos two and four?"

"Off."

"Gyrocompasses? . . ."

At 12:37 p.m., Greenwich time, used universally by transatlantic planes, Capt. Dugan stood on his brakes and advanced the throttles on his four gas turbines to full r.p.m. It was 1:37 p.m. London local time and 8:37 a.m. in New York. Back in the cabin, blonde and pretty Mary Chugkowski, one of the stewardesses, glanced at her wrist watch. She had a date this evening in New York.

A thousand pounds of fuel had already been used up since loading, when Capt.

At London, 86,900 pounds of fuel —13,166 gallons—had been pumped into the wing tanks.

Dugan released his brakes. At the same instant, Warren tripped a stopwatch on the instrument panel.

In 31 seconds the jet was registering 100 knots, about 115 miles an hour. That meant the power put out by the engines was right on the button. If it had not been, there was runway enough at that point to chop the throttles and brake to a stop.

As the air-speed needle neared the takeoff speed, 147 knots, other dials were registering engine revolutions—10,775 a minute.

"Rotate," said Warren, his eyes on the dials. The term, as new as jet airliners, means: hoist her nose up.

Dugan pulled back on the control column. For a long second, nothing happened. Then the big jet was airborne, gently and smoothly.

The takeoff had required 52 seconds. The moment the eight wheels of the main landing gear left the ground, automatic brakes stopped their rotation. If they had continued to spin, gyroscopic effect would have made them resist sideways retraction into the plane's belly.

The climb-out, leaving a wake of four streamers of black smoke, caused by the water injection, was rapid.

Climbing steeply, the jet pointed westward toward Strumble, on the Irish Sea. No longer was there engine noise, but only the muted sound of a great wind.

Problems of navigation. Now the flight crew cleaned up the check list. At takeoff the flap setting for additional lift had been 30 degrees. Since the plane had crossed the 165-knot mark, flap had been reduced progressively until it was back to zero. The ignition had been left on throughout the takeoff to meet the possibility of an engine flameout. Now the ignition was off, together with the water pumps.

Landing at Gander, Newfoundland, the jet was across the Atlantic —2,388 miles in five hours.

Capt Dugan and his crew had three tasks in crossing the ocean, each complicated by the speed of their airplane and its voracious appetite for fuel. They had to get across with enough reserve fuel to fly to their nearest alternate airport, Sydney, Nova Scotia, and orbit there for 45 minutes in case weather prevented a landing at Gander. They had to navigate through more than 2,000,000 cubic miles of air in a corridor 130 miles wide, allowed them under international air-traffic rules. And they had to check in with monitoring land stations that demanded position reports each 30 to 40 minutes and behaved, each of them, as though the plane were a personal possession.

Preflight on paper. The trip had been "preflown" on paper as carefully as had the takeoff. From a score of weather stations in the U. S. and Canada, and a half-dozen weather ships permanently stationed in the North Atlantic, had been drawn a prognostic chart—a "prog"—describing a "least-time line," in six segments. Capt. Dugan was not interested in the weather on the route as such. He would fly above it. What did interest him were the temperatures and winds.

Outside temperatures warmer than the minus 70 degrees F. that was ideal for the Clipper's jet engines cost fuel. Each degree would cost the equivalent of 2,500

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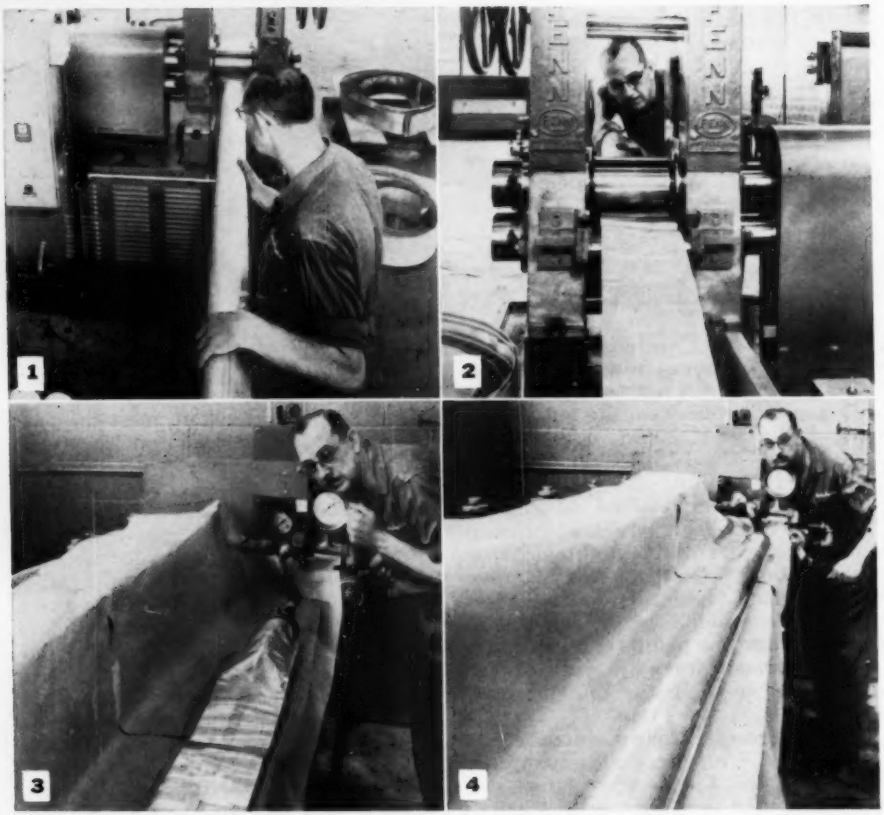
At New York the passengers streamed off, clutching the trinkets bought in Europe.

PS Picture News



INFLATABLE PIPE. This thin-wall metal tubing is shipped flat to save space. It is made as a seamless tube (1), flattened in rollers (2), connected on delivery to a compressed-air or water outlet (3) and blown up for use (4). Calumet & Hecla, Allen Park, Mich., calls it Strubing, makes it in lengths to 15,000 feet.

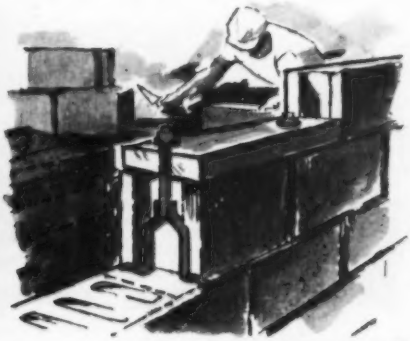
RADAR LANDING. The big B-47 jet bomber above is being brought to a smooth landing with only the radar equipment at right. Converted to 600-m.p.h. pilotless planes by Lockheed and Sperry, two of the craft are being tried out at Eglin Air Force Base, Fla., for use in realistic testing of U. S. air defenses.

New Ideas from the Inventors

Spray Brands Purse Snatcher. With a spray bomb like this clipped to her purse strap, a woman needn't be defenseless against muggers or robbers. A squeeze would spray an acid from one chamber and a luminous dye from another. The combination would temporarily blind an attacker, and mark him for identification.

Flashlight Becomes Blinker. You could turn any ordinary flashlight into a signal blinker—for emergency roadside repairs—by substituting this spring-wound base for the bottom cap. The mechanism would flash the light on and off by alternately pressing and releasing the cells.

Bolt Fixes Sill to Block. Masons and do-it-yourself garage builders could attach sills to these anchoring bolts without waiting for mortar to set. Easily inserted in the hollow of a cement block, the springy, welded-on legs would center the bolt, hold it secure and upright.



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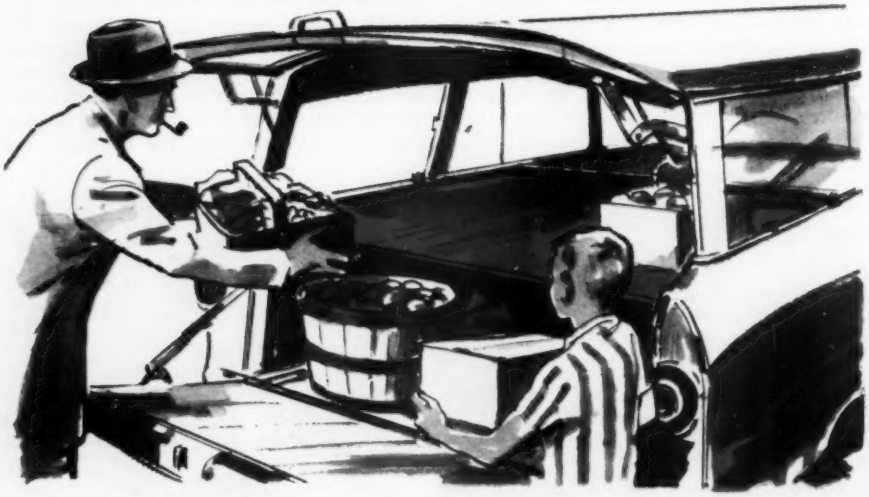
More Inventors' Ideas

Alternating Cylinders Save Gas. Car and truck engines are most efficient at higher loads, so this GM-patented fueling system would respond to lowered throttle or torque demand by firing alternate cylinders—on a rotating schedule—to make them work harder but more economically.

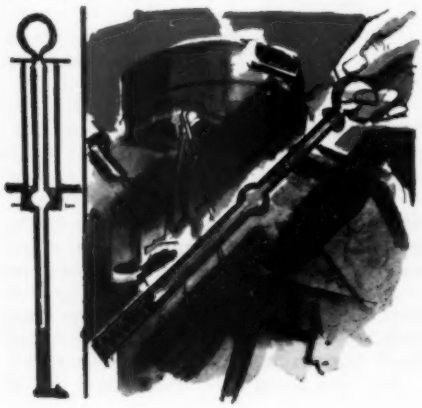
Can Collar Catches Paint Spills. Slipped into the neck of a standard can, this extension collar would keep paint from slopping as you stirred it or mixed in color or thinner. It would make pouring easier, permit tighter resealing by keeping paint out of the lid-retaining groove.

Shelf Increases Cargo Space. The family wagon could load more packages more easily if it had a removable shelf to double floor space. One inventor rests a divider on crisscross arms unfolding from brackets clamped to the window ledges. When not needed, shelf and supporting arms would fold snugly out of the way.



Caster Retracts Under Weight. A chair resting on these spring-loaded glides could be moved easily but would stay put when you sat down. The weight-retracted rollers could be used also on machine bases and other usually stationary objects that must occasionally be moved.

Dipstick Wipes Itself. Interlocking notches on a two-legged dipstick would let you gauge crankcase level with a single, no-wipe dip. A spring collar would mesh the teeth when the legs were fully inserted but let them separate at the first tug. Oil that then filled the submerged notches would be held by capillary action until you had taken your reading.



Disappearing Posts Foil Fans. Goal posts wouldn't be destroyed by enthusiastic rooters if they could be lowered by motor promptly into vertical casings in the ground. The crossbar would slide up as the posts submerged, and rest in the below-ground motor trench.

The following patents *have been issued on these inventions:* **Thief chaser**—*No. 2,876,935 to D. P. Lindberg, Chicago;* **Flasher**—*No. 2,763,850 to J. N. Nieratko, Englewood, N. J.;* **Sill bolt**—*No. 2,829,514 to E. R. MacLean, Elmira, N.Y.;* **Economy engine**—*No. 2,875,742 to J. Dolza, Fenton, Mich.;* **Can Collar**—*2,771,208 to J. Chovanes, Hazleton, Pa.;* **Wagon shelf**—*2,767,896 to C. E. Beck, Iowa City;* **Casters**—*2,770,831 to W. W. Angelica, Cicero, and R. T. Miller, Clarendon Hills, Ill.;* **Dipstick**—*No. 2,771,680 to G. H. Lee, Oak Ridge;* **Posts**—*No. 2,884,252 to J. E. Thompson, Oklahoma City.*

Copies of patents may be ordered, by number, from the Commissioner of Patents, Washington 25, D.C., at 25 cents each. To write to an inventor, if the address given above is insufficient, you may address him (by name and patent number) in care of the Commissioner of Patents.

Why I Believe in

Scientific evidence, says this authority, backs up mariners' tales of monsters of the deep—and someday we may catch one!

By Dr. Anton F. Bruun, as told to Wesley S. Griswold

I HAVE never seen a giant sea serpent, but I have a very good reason for believing that such a creature exists.

At least, I know that somewhere in the seas there must be eel-like fish of enormous size, for I have seen one of them in what you might call its tadpole stage. Even then, it was *six feet long*. That is 24 times as big as the average fresh-water eel is at that point in its growth!

I saw this extraordinary specimen on a February night in 1930, when I was a young assistant zoologist aboard a Danish trawler on a research expedition off the southwest coast of Africa. We were cruising between the Cape of Good Hope and the tiny island of St. Helena, where Napoleon died in exile. Later, I will tell you why this location seems especially significant to me.

We were hunting for marine fish larvae in the surface layers—the top 300 feet or so—of the ocean. We knew that when we found larvae, we would be close to the breeding grounds of their parents, and it was breeding grounds that we were trying to locate.

Now, the larvae of all eels have a characteristic appearance, as typical of their family as the tadpole is of the frog clan. They look like little strips of transparent tape, with a tiny head and a pair of eyes at one end. Their bodies are very hard to see, but their eyes are silvery and shine in the light.

The scientific name for the larval form of any eel is leptocephalus, a Greek word meaning "creature with a little head."

Editor's Note: Dr. Anton F. Bruun, lecturer on oceanology at the University of Copenhagen, is a world-renowned marine biologist. He expressed his fascinating opinions on the subject of sea serpents to POPULAR SCIENCE on the eve of departing for the South China Sea and the Gulf of Thailand, as scientific leader of a year-long University of California expedition to explore marine resources in those oceanic regions.

The leptocephalus of the common fresh-water eel is about two to three inches long, but it grows into an adult that averages three feet in length. The leptocephalus of the conger eel is usually around five inches long, but a grown-up conger is often eight to 10 feet long and weighs 100 pounds or more.

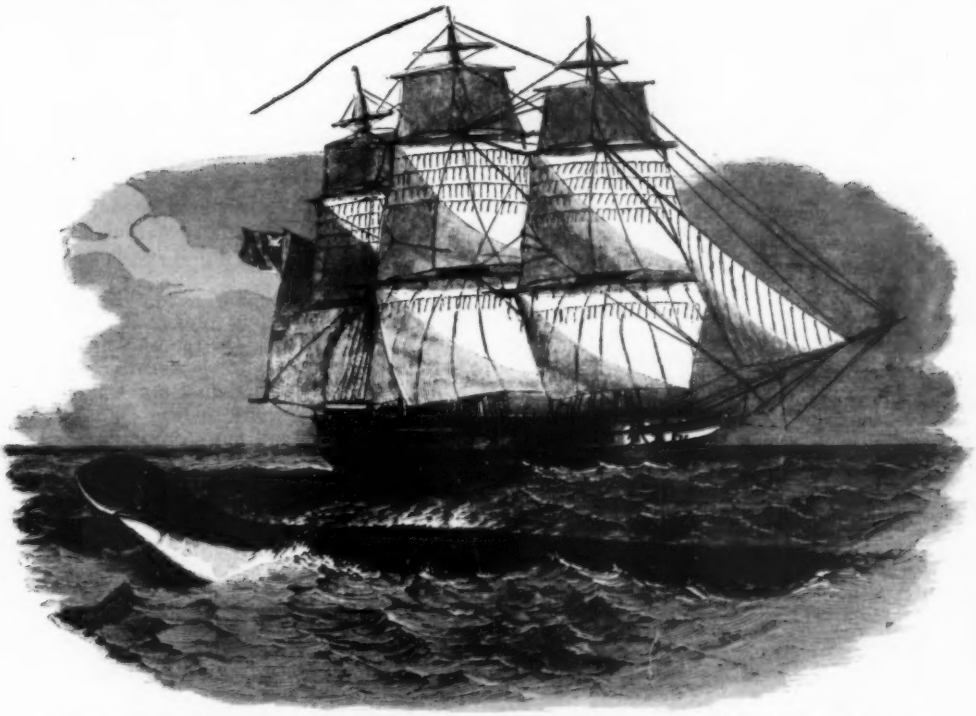
Six-foot baby. You can imagine how astounded we were, on that long-ago February evening, when we found in one of our nets a leptocephalus six feet long! It had a small, pointed head, with long fangs in the jaws, and seemed to be a typical larval eel in all respects except for its gigantic size. If we were to apply to it the same ratio of growth that we know to be true of other members of the eel family, we could expect that this monster we netted might have grown to be 72 feet long. But I prefer always to be conservative. Let us say that at the very least it would have reached a length of 30 feet, and probably 50.

Any mariner who ever saw an eel that big would be justified in reporting that he had seen the Great Sea Serpent of the legends.

Elusive parents. We hoped eagerly, of course, that we might find one of the parents of our giant leptocephalus swimming around in the vicinity, but we weren't that lucky. We had to be content with two undeniable facts: Our baby must have had parents, and they must have been near where we found it.

But we never saw them, and in 30

Sea Monsters



THOUGH GREATLY EXAGGERATED in relative size in this 101-year-old drawing from the *Illustrated London News,* the sea monster seen from the Daedalus looked like this, declared the ship's captain when he saw the picture. His official report had stated it was 15 or 16 inches thick.

years of extended travels on the oceans of the world, I have not seen any creature, or even a small part of one that could be identified as a member of that spectacular species.

I am convinced, however, that other people have, in the course of centuries past.

I have read most of the accounts of early voyages of discovery, and I have been struck by the fact that many sightings of so-called sea serpents were made in the same general area of the South Atlantic where we found our great leptocephalus.

Unquestionably, some of those ancient mariners had merely seen schools of porpoises in fog or dim light, and mistaken the rhythmically curving backs of those frolicsome creatures for the coils of a sea serpent.

But some of the objects that mystified and awed them were definitely not porpoises.

Consider the most famous sighting of all, reported by the captain of the British frigate Daedalus in October, 1848. This occurred in the course of a voyage between the Cape of Good Hope and St. Helena.

Hard facts from keen observers. The remarkable experience of Capt. Peter M'Quhae and fellow-officers on the Daedalus was reported in the London *Times* as soon as the frigate had docked in England. It created a sensation, and the Admiralty at once asked Capt. M'Quhae for

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an official explanation of what he had seen.

Here is part of his written reply:

". . . at 5 o'clock p.m., on the 6th of August last, in latitude 24° 44′ S., and longitude 9° 22′ E., the weather dark and cloudy, wind fresh from the N.W., with a long ocean swell from the S.W., the ship on the port tack heading N.E. by N., something very unusual was seen by Mr. Sartoris, Midshipman, rapidly approaching the ship from before the beam. The circumstance was immediately reported by him to the officer of the watch, Lieutenant Edgar Drummond, with whom . . . I was at the time walking the quarterdeck. The ship's company were at supper.

"On our attention being called to the object, it was discovered to be an enormous Serpent, with head and shoulders kept about four feet constantly above the surface of the sea; and as nearly as we could approximate by comparing with the length of what our maintopsail-yard would show in the water, there was at the very least sixty feet of the animal on the surface of the water . . . It passed rapidly, but so close under our lee quarter that had it been a man of my acquaintance, I should have easily recognized his features with the naked eye; and it did not, either in approaching the ship or after it had passed our wake, deviate in the slightest degree from its course to the S.W., which it held on at the pace of from 12 to 15 miles per hour, apparently on some determined purpose.

"The diameter of the Serpent was about 15 or 16 inches behind the head, which was, without any doubt, that of a snake; and it was never, during the 20 minutes that it continued in sight of our glasses, once below the surface of the water—its colour a dark brown, with yellowish white about the throat. It had no fins, but something like the mane of a horse, or, rather, a bunch of seaweed, washed about its back. It was seen by the quartermaster, the boatswain's mate, and the man at the wheel in addition to myself and officers above mentioned . . ."

I am ready to accept the testimony of those presumably hard-headed and certainly experienced men of the sea as substantially accurate.

Ship's gun vs. serpent. Capt. M'Quhae's letter was widely reprinted. One quick response to it was a report that on September 20, some six weeks after the sighting from the Daedalus, the officers and crew of the American brig Daphne had had a similar but more dramatic experience. At the time, the Daphne was in South Atlantic waters, too, but many miles northwest of where the Daedalus had been on August 6.

The Americans had seen "a most extraordinary animal" with "the appearance of a huge serpent or snake." They had loaded a deck gun with spikes. When the serpent was at a distance of only 40 yards from the vessel, they fired at it. The account continued:

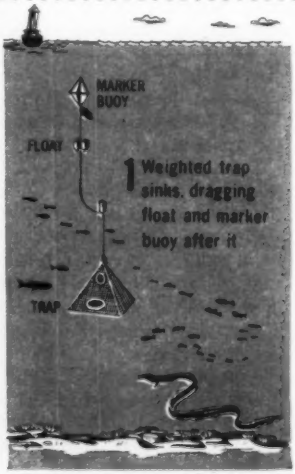
"It immediately reared its head in the air and plunged violently with its body, showing

Will This Trap Catch a Sea Monster?

If sea serpents exist, this pyramid-shaped trap offers a likely way to catch them. So say Scripps Institution of Oceanography researchers at La Jolla, Cal., who are testing it for snaring all sorts of deep-sea creatures. Into an aluminum-framed cage of fiberglass netting, an upper conical entrance invites swimming fish; a lower one, crawlers and wrigglers. Supposing sea serpents to be giant eels, they'd find the trap alluring; eels wriggle into holes, curl up, await food going by.

Weighted with an iron base and dropped from a ship, the trap sinks to the bottom, dragging along a gasoline-filled plastic float and a marker buoy. After time enough to gather specimens, a corroding magnesium-metal link breaks, letting a spring detach the heavy base. The float draws the lightened trap to the surface, and the marker buoy displays a radar reflector, a flag, and a flashing light to guide searchers.

Following successful sea trials of a model with six-foot sides, a 12-footer has been designed. Larger ones are in prospect if there are signs of still bigger game to be caught.



declares marine scientist

evidently that the charge had taken effect. The Daphne was to leeward at the time, but was put about on the starboard tack, and stood towards the brute, which was seen foaming and lashing the water at a fearful rate. Upon the brig nearing, however, it disappeared, and, though evidently wounded, made rapidly off at the rate of fifteen or sixteen knots, as was judged from its appearing several times upon the surface. The Daphne pursued for some time, but, the night coming on, the master was obliged to put about and continue his voyage.

"From the description given by the mate, the brute must have been nearly 100 feet long, and his account of it agrees in every respect with that lately forwarded to the Admiralty by the master of the Daedalus . . ."

Expert testimony. As a scientist, though, I am more impressed by first-hand reports to the Royal Zoological Society of Great Britain by Michael J. Nicoll and E. G. B. Meade-Waldo, two zoologists, who were aboard the yacht Valhalla, off Parahiba, Brazil; on December 7, 1905. It was in the middle of the morning, when Nicoll suddenly turned to Meade-Waldo and said, "Is that the fin of a great fish?"

Wrote Meade-Waldo:

"I looked and immediately saw a large fin or frill sticking out of the water, dark seaweed-brown in colour, somewhat crinkled at the edge. It was apparently about six feet in length and projected from 18 inches to two feet from the water.

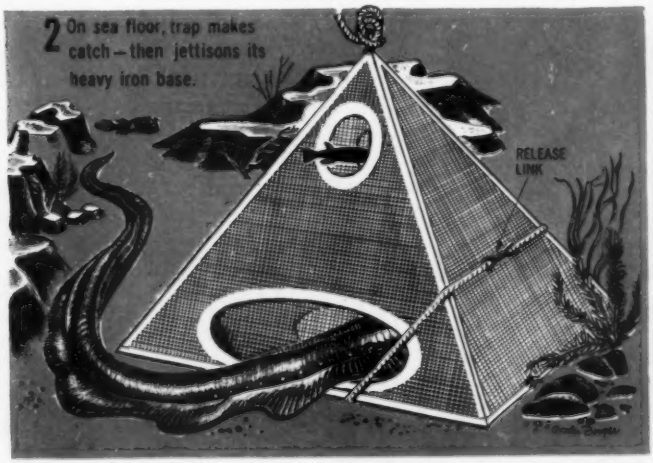
THE MONSTER SWAM SO CLOSE to the stern of the Daedalus that its skipper reported, "Had it been a man of my acquaintance, I should have recognized his features with the naked eye."

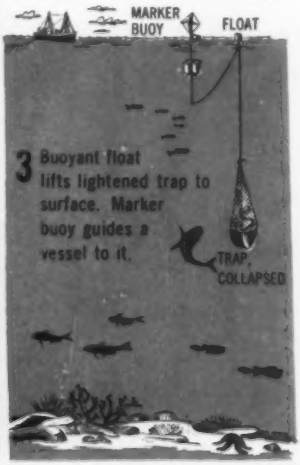
"I got my field glasses onto it, and almost as soon as I had them on the frill, a great head and neck rose out of the water. The neck appeared about the thickness of a slight man's body, and from seven to eight feet was out of the water; head and neck were all about the same thickness.

"The head had a very turtle-like appearance, as had also the eye. The colour of the head and neck was dark brown above and whitish below—almost white, I think.

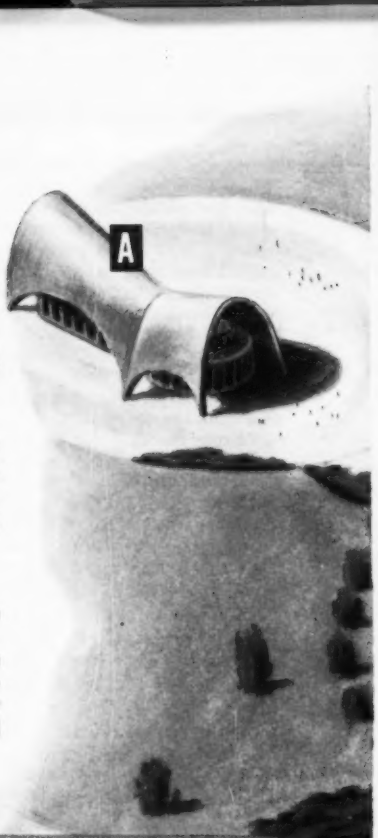
"I could see the line of the mouth, but we were sailing pretty fast, and quickly drew away from the object, which was going very slowly. It moved its neck from side to side in a peculiar manner . . ."

[*Continued on page 270*]





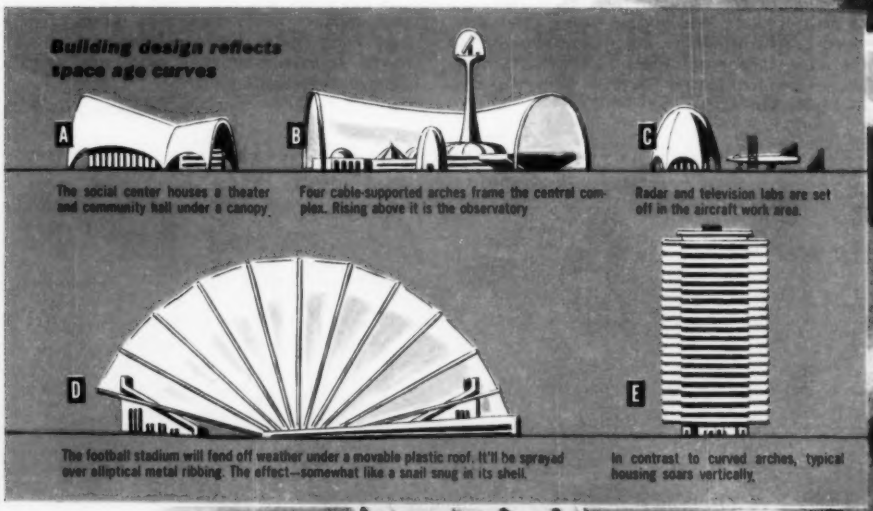
A Dream Clubhouse for Space-Age Boys



TOMORROW'S kids will play with solar energy and atomic batteries. They'll tinker with radar and spacecraft engines. To match those advanced hobbies, the Boys' Clubs of America asked designers to plan "Boy-Topia," a clubhouse of the future, with:

- An aircraft work area and shops
- Television and radar labs
- A central building with library, lecture halls, lounge and observation tower

The traditional stadium, swimming pool and gym are there, too. Most facilities will be housed under parabolic-arched plastic shells, either air-supported or poured over metal frameworks. Designers were Griswold, Heckel, and Keiser Associates, Inc., of New York.



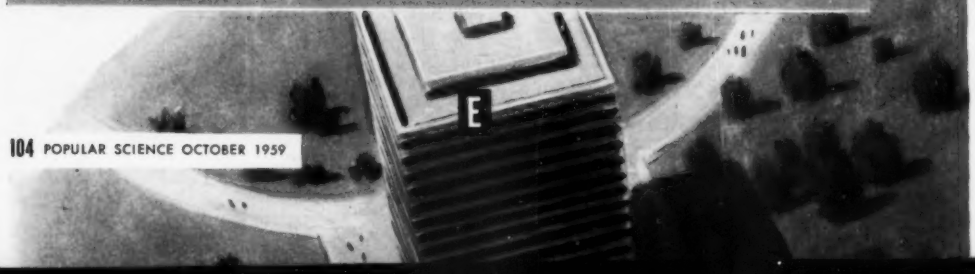
The social center houses a theater and community hall under a canopy.

Four cable-supported arches frame the central complex. Rising above it is the observatory

Radar and television labs are set off in the aircraft work area.

The football stadium will fend off weather under a movable plastic roof. It'll be sprayed over elliptical metal ribbing. The effect—somewhat like a snail snug in its shell.

In contrast to curved arches, typical housing soars vertically.



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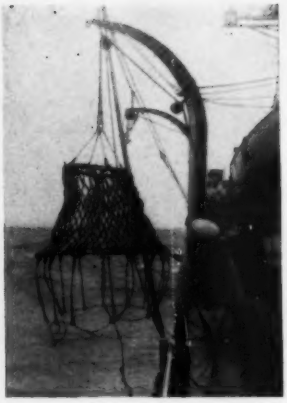


1. "TEA BAG" is hung from davit swung outboard. It is made of manila rope held in shape by two metal rings. Rope pendants suspended from the larger ring at the bottom have a drawstring running through them.

2. BOBBING CAPSULE is hauled to the side of the ship and a rope is run through a shackle in its end to keep it from floating away out of reach. The net, poised over the nose cone, is then dropped into place.

Navy Bags Missile Nose Cones

THE Navy is trying out a basket to snatch missile nose cones from the sea. If the experiments succeed, the rig may be used to recover the first capsule carrying a man into space in 1961. The net was devised by a seaman—George J. Halter, chief boatswain's mate aboard the destroyer tender Shenandoah. It looks like a tea bag and is used like a fishing net. The basket was designed for use on

BABY BREATHER. This tiny resuscitator, the world's smallest, is used here on a parakeet. It was developed to help newborn babies who have trouble drawing their first breath. It admits oxygen through a pinhole in the thimble mask.

STORM FINDER. The 18-foot plastic ball above is intended to house a new radar with which the New York Weather Bureau hopes to locate distant storms. It is atop the 70-story RCA building—above interference from nearby skyscrapers.

3. DRAWSTRING IS PULLED to close the bottom pendants tightly around the capsule. The captive object is then gently lifted from the water.

4. SAFELY ABOARD. The nose cone is brought to the deck of the patrol ship where it can be opened or taken to shore for detailed study.

destroyers, but it is adaptable to any surface ship and may eventually be part of the equipment of all Navy ships. Besides recovering nose cones, it could be used for rescuing men overboard or picking up other objects from the sea.

DISPLAY CASE. When P. J. Amico, Flushing, N.Y., became the proud owner of an MG-A second car, he put a prefab aluminum-and-glass greenhouse on his garage. It not only protects the new machine, but also shows it off to neighbors.

GUN MUZZLE. This striking view of a 90-mm. cannon mounted on a U.S.-made M-47 Patton tank shows the muzzle brake that reduces recoil when the gun is fired. It was taken during maneuvers of the Austrian army.

Battle of the NEW U.S. SMALL CARS

By Ken Fermoyle and Devon Francis

THIS month something new will appear on U. S. highways. Putting an end to two years of rumors and denials, Detroit's Big Three—Chrysler, Ford and General Motors—are introducing their smaller, "compact," six-cylinder cars.

On this page you can see how the new cars compare in size with the regular Plymouth, Ford and Chevrolet.

FALCON: 27" shorter than Ford

The rumors were true. The new automobiles are shorter, narrower and lighter. They will go farther on a gallon of gas. They are powered with tinier engines than the bulk of Detroit cars have used in two decades. They're priced lower. Along with our Ramblers and Larks, they are America's answer to the influx of "little foreign cars."

The first to be announced are Chevrolet's Corvair and Ford's Falcon.

The Corvair sports an engine that's back where the trunk usually is. Nor is it an ordinary engine. It's made of aluminum and the cylinders lie flat, three on each side of the crankshaft. The only cast iron used is in the cylinder liners, to absorb piston friction.

CORVAIR: 31" shorter than Chevrolet

The Falcon is more conventional on three counts. The engine is made of cast iron, it stands up-and-down, and it's in front under the hood.

The third of the smaller cars is Chrysler's Valiant. It's a little bigger. It has more power. Its cast-iron engine is up front in traditional style, but is tilted rakishly to one side. Like the Corvair, it has aluminum intake pipes. Like the Falcon, it's conventional in construction. More details on the Valiant will appear next month.

VALIANT: 24" shorter than Plymouth

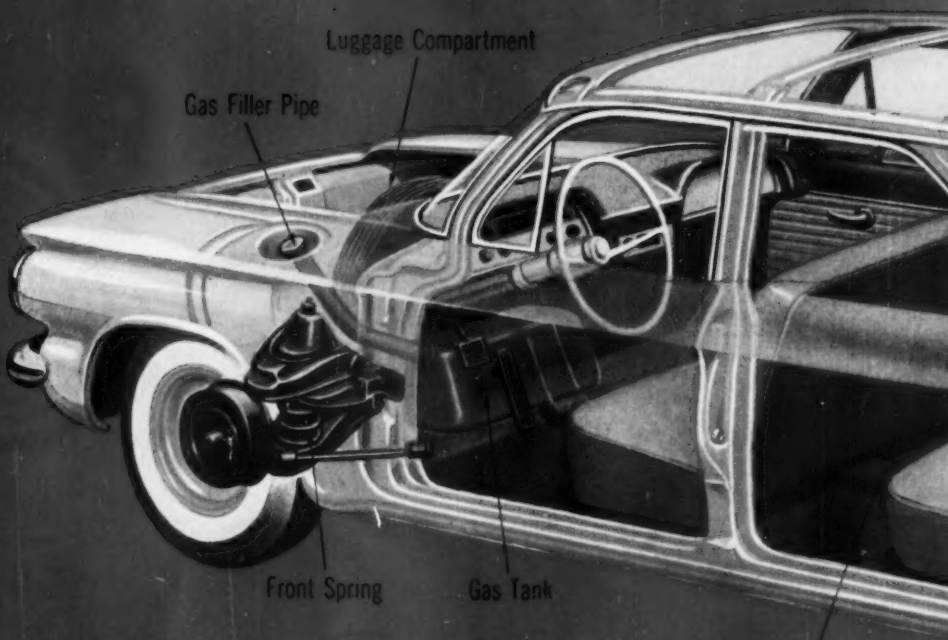
In the following pages, POPULAR SCIENCE tells you all about these new cars:

- How they compare with other small cars.
- What they're like to drive.
- How sassy the engines are.
- How they're built.
- Their good points and their bad ones.

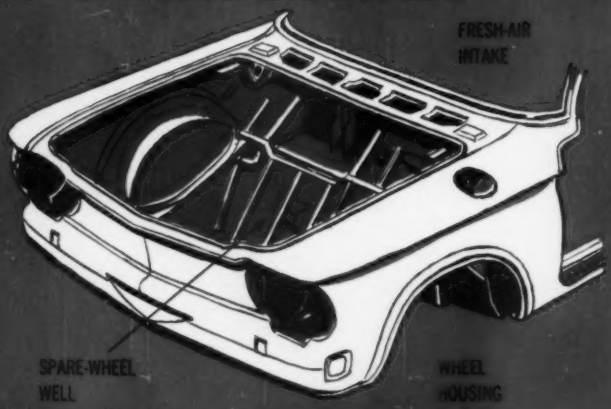
See foldout for X-ray view of two new small cars ▶

Unfold here for exclusive phantom views
AMERICA'S TWO NEWEST CAR

Inside the CORVAIR

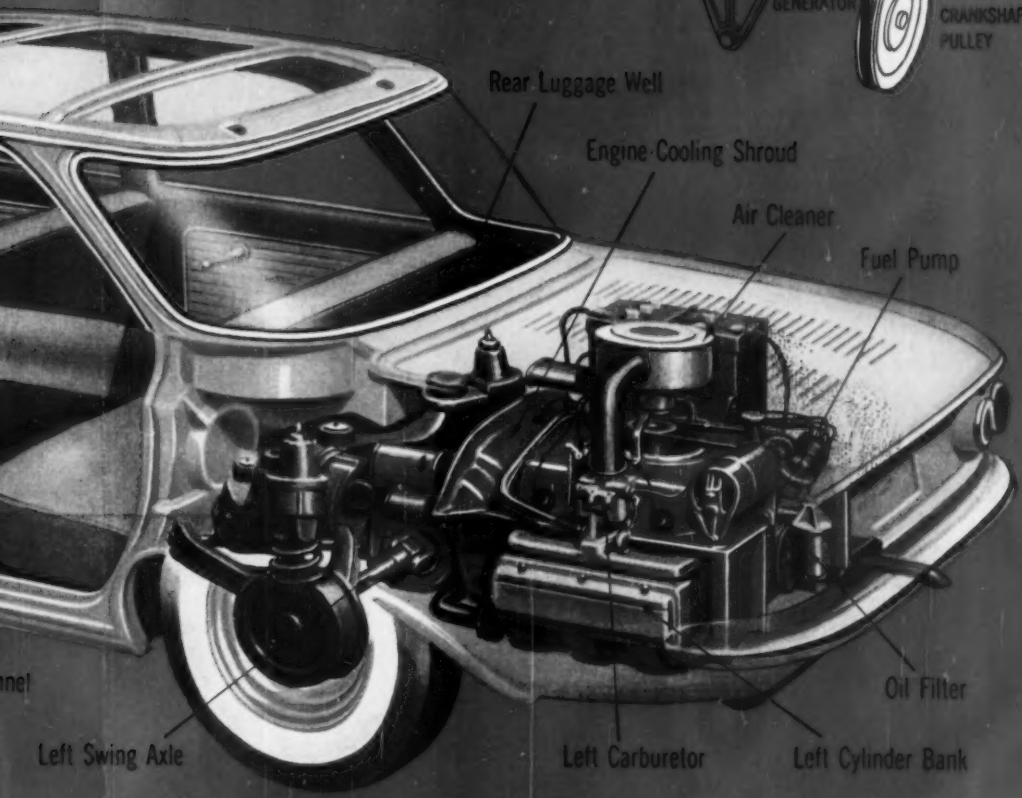


Front-End Structure

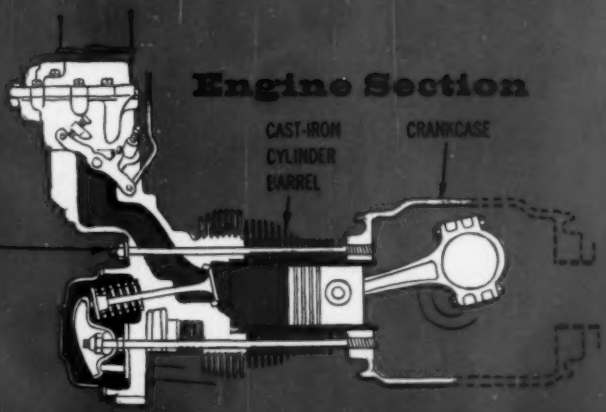


Copyright 1959
Popular Science Mont

Fan Drive



Engine Section



1959 by
Monthly

Inside the FALCON

Spring-Mounting Pocket

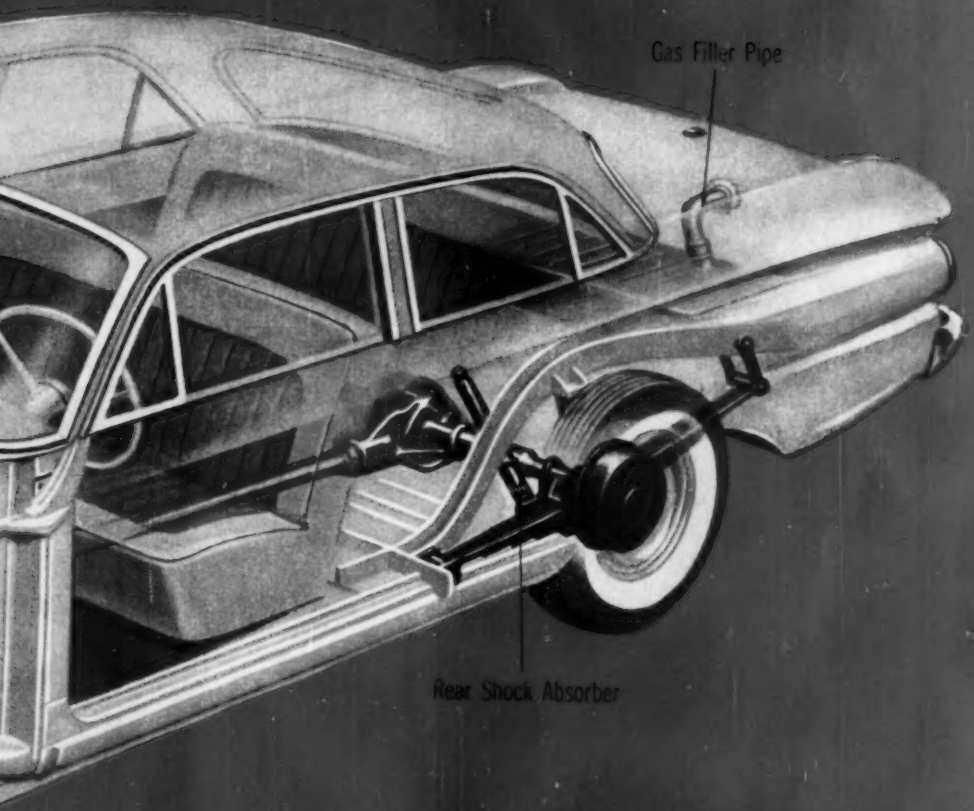
Dual Headlamps Optional

Oil Filter

Lower Front-Spring Pivot Mounting

Front Spring and

Engine Section



and Shock Absorber

Rear-End Structure

CORVAIR

How the U.S. Small Cars Compare

FALCON

In the table below, all the cars listed have six cylinders except the imports, which have four. Corvair, Falcon and Valiant specifications are for 1960, the others for '59 models. Measurements are in inches except where otherwise specified. "NA" means Not Announced at press time.

	OVERALL MILES PER GALLON (estimated)	LENGTH	WIDTH	HEIGHT	WHEELBASE	CURB WEIGHT (pounds)	HORSEPOWER	PISTON DISPLACEMENT (cu. in.)	HEAD ROOM		HIP ROOM		LEG ROOM	
									Front	Rear	Front	Rear	Front	Rear
Corvair	26	180	66.9	51.3	108	2,415	80	140	38.7	38	57.8	57.6	42.8	36.5
Falcon	26	181.1	70	54.5	109.5	2,396	85	144.3	33.9	32.8	57.1	57	43.3	39.4
Lark	21	175	69	57.5	108.5	2,745	90	169.6	35	33	59.5	59	44	41
Rambler	21	191.2	72.2	58	108	3,042	127	196	36	35	59.8	60.1	43	40
Valiant	24	184	70.1	54	106.5	n.a.	n.a.	171.1	33.8	33.6	57	56.9	44.4	38.9
How they compare with U. S. standard cars														
Chevrolet	18	210.9	79.9	56	119	3,787	135	236	36.1	34.3	66.1	65.5	45	42.8
Ford	18	208	76.6	56	118	3,644	145	223	33.5	33.3	60.4	60.8	42.7	40.3
Plymouth	18	208.2	78	56.6	118	3,446	132	230	35.7	34.2	63	62.7	45.5	41.5
How they compare with typical imports														
Ford Anglia	28	151.2	60.5	58.7	87	1,623	36	71.6	35.5	32.5	51	36	43	40
Opel Rekord	28	174.5	63.6	56.7	100	1,995	56	90.8	35	33.2	52.5	52.5	44	37
Renault Dauphine	34	155	60	56.7	89	1,395	32	51.54	34.5	32.5	50.7	50.3	40.5	37
Simca Aronde	28	162	61.2	57	96.2	2,053	48	78.7	34	34.5	51.5	52.5	42.5	42.5
Volkswagen	34	160	60.5	59	94.5	1,802	36	72.7	36	32	48	51.5	44.5	41

CONTINUED

New U.S. Small Cars

What They're

CORVAIR

THERE'S plenty of entrance room and you board easily. Inside, there are several inches more head room than in Chevy's swank Impala, and ample leg room for a six-footer. Pedal widths are adequate, but no more. Automatic-transmission jobs have a selector lever on the instrument panel; manual-shift cars have a floor-mounted lever.

The engine key-starts, and it idles smoothly. It sounds noisy to people standing nearby outside. Inside, thanks to liberal insulation, it isn't noisy.

Acceleration. For all-out getaway you make the low-to-second shift at 25 m.p.h., the second-to-high shift at 50. This gives you zero-to-60 in 17 or 18 seconds—better than most of the imports, far slower than recent big-engined Detroit iron.

Surprisingly, the automatic-transmission car clocks almost identical times. Both show good performance in passing-range acceleration and in hill-climbing ability. At 24 pounds per horsepower, Corvairs will not be sluggish highway hazards like some imports. Top speed is well above 80 m.p.h., and 65 to 70 is a comfortable cruising speed.

PS DETROIT EDITOR Ken Fermoyle gets aboard new Corvair at General Motors Proving Ground.

FALCON

ENTRY is as easy as in full-size Fords, and maybe easier, since there's no dog-leg in the front pillar. The interior is surprisingly roomy, about the same as a 1957 Ford except for a couple of inches less interior width.

Performance. Both stick-shift and automatic versions use a steering-column lever. Getaway in the automatic feels a bit sluggish, and a full-bore zero-to-60 run clocks at a leisurely 22 seconds. Manual-shift Falcons are three to four seconds quicker. Top speed is in the 80s. You could drive the Falcon all day, and long trips would be no chore—but you would win few green-light drag races.

Ride and handling. On harsh surfaces the Falcon rides beautifully, with none

ON FORD'S TEST TRACK at Dearborn, Fermoyle whips a Falcon around a banked curve.

Like to Drive

Steering and handling. The steering is precise and light. No power steering is offered; none could rationally be wanted. The car goes exactly, not approximately, where you point it. Overall ratio is 23½:1, with five turns from lock to lock.

Cornering is excellent. If you push the car through a hard turn you will find that oversteering—a tendency of the rear end to swing a car around on a turn—has been minimized. Some little oversteering is present, however. Pressed to the edge of a slide, the Corvair's rear end drifts out a bit, but stops as you ease off slightly on the wheel. Weight distribution—and handling characteristics—are the same whether the car is carrying just one or is fully loaded.

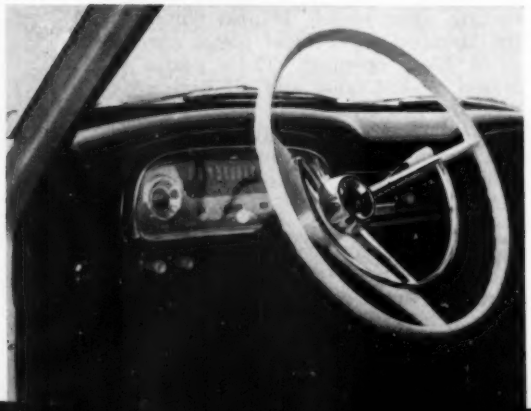
Rough-road ride. The wide-base 6.50-by-13 tires—running at 15 pounds in the front, 26 in the rear—combined with fully independent suspension, soak up the bumps very well. On bad surfaces you can hear the wheels pitter-pattering up and down, but little of the road shock reaches you. There is little pitch.

Brakes. Though the Corvair's front wheels support only 40 percent of the weight at rest, forward weight transfer during braking equalizes the work done by the nine-inch drums. On repeated hard stops, the car holds course and pulls down quickly.

CORVAIR'S REAR END drifts slightly as car corners hard, but there's little body sway.

of the rough, bouncy feel of many imports. It is a comfortable car. Even on tight turns, while not remotely a sports car, it sticks nicely in the corners. There is some body sway, although you'll find it less than in plenty of U. S. big cars.

FALCON INSTRUMENT PANEL is simple and easy to read. Gearshift lever is mounted on column.



Compact though it is, the Falcon has a typical American-car feel. Its drivers won't have to make adjustments in their driving habits.

Steering is light, and no power assist is needed (or offered). The overall ratio is 27:1. Thanks to the car's relatively small size and compact turning circle (37.7 feet), parking is a breeze. It takes a bit more than 4½ turns of the steering wheel to turn the front wheels from full right to full left.

If you make a series of fast stops to check out the brakes, you'll be surprised at the lightness of the pedal pressure. They feel like power brakes, which they are not. Only a little brake fade was perceived after six or seven hard stops in succession.

CONTINUED

New U.S. Small Cars

What Makes

CORVAIR

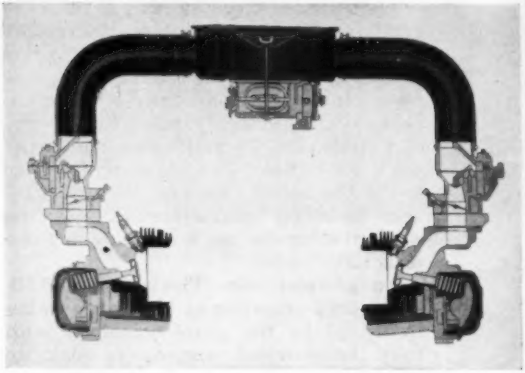
THE 80-horsepower Corvair engine has no block. Displacement is 140 cu. in., yet it weighs just 310 pounds—half the weight of big U. S. V-8s, and 40 pounds less than the 91-cu.-in. English MG engine.

A rear-mounted engine must be light to keep front/rear weight distribution in reasonable balance. Engineers figure the practical maximum on the rear wheels is 60 percent of total car weight.

Chevy kept within the limit by designing an air-cooled engine and using lots of aluminum.

It's an opposed-cylinder engine. Visualize a V engine with the angle between cylinder banks increased to 180 degrees. This compact layout has long been used in light plane engines, some foreign cars.

The opposed, or "flat," engine has the virtue of inherent balance. Its forged-steel crankshaft has six throws arranged in pairs. Each crankpin is 180 degrees from the other member of its pair and the pairs are spaced 60 degrees apart.



TWO CARBURETORS supply fuel to the Corvair. Each feeds three of the engine's cylinders.

FALCON

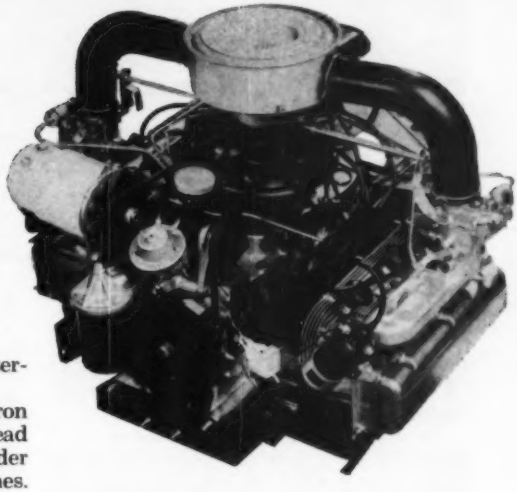
IN CONTRAST to the Corvair, the Falcon six is water-cooled and has a cast-iron block. Despite that, dry weight of the 144-cu.-in. engine is just 345½ pounds. Modern foundry techniques get the credit for this accomplishment.

The head and intake manifold are cast in one piece that is stronger and lighter than separate castings would be. This eliminates the big opening left in the side of most in-line engine blocks to make casting them easier. It also eliminates the stamped sheet-metal plates used to cover these openings. Those plates vibrated, leaked noise and oil, and weakened the block itself.

Short stroke. The 85-horsepower Falcon engine is very much oversquare. Bore is 3½ inches, stroke just 2½ inches.

EASY SERVICING is emphasized in the Falcon engine. Its components are easy to get at.

'Em Go



SIGN OF THINGS TO COME? Performance of Corvair engine, made with liberal quantities of aluminum, is being watched by other car makers. Most are planning aluminum engines.

Thus the shaft needs no heavy counterweights.

Each cylinder is simply a cast-iron barrel clamped between its cylinder head and the aluminum crankcase. Cylinder bore is 3⅜ inches, stroke 2-3/5 inches. Compression ratio is a mild 8:1.

The crankcase is the structural backbone of the power plant. Roughly rectangular, it's cast in two halves and bolted together.

The camshaft is located below the crankshaft and rides in bearing surfaces machined out of the aluminum crankcase itself. It has only three exhaust-valve lobes. Each is twice the width of intake lobes and actuates push rods for two exhaust valves. Valves are in the head, and valve lifters are hydraulic.

Look, no shaft: The Corvair's engine, transmission and differential are mounted in the chassis as a unit. The transmission is farthest forward and the engine is at back, with the differential sandwiched between.

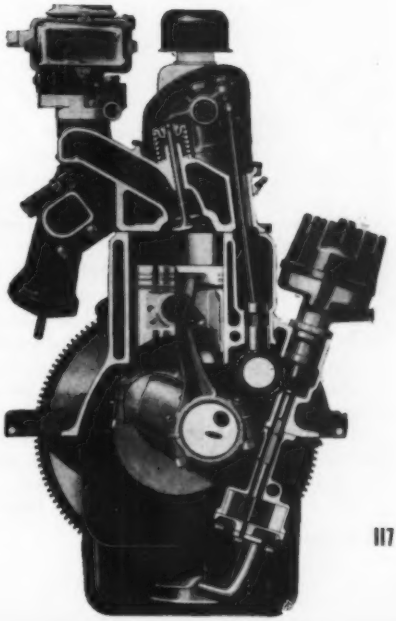
Both manual and automatic transmissions have cast-aluminum cases to keep weight down. Standard rear-axle ratio for both transmissions is 3.55:1; an optional 3.89:1 ratio is available for stick shifts.

This reduces friction, but at the expense of low-end torque.

One single-barrel carburetor feeds all cylinders through six individual ports. Overhead valves are worked by pushrods and have mechanical, not hydraulic, valve lifters.

The Falcon block is just eight inches high. It does not extend down below the crankshaft centerline as does the four-inch deeper block of Ford's "I-Beam" six.

A three-speed stick shift with synchromesh on second and high gears is standard. Overdrive is not offered, but two-speed Fordomatic is available as an option. Rear-axle ratio, with either manual or automatic transmission, is 3.10:1—a selection obviously made for economy, not performance.



REFINEMENT, NOT REVOLUTION is the keynote of the Falcon valve-in-head six-cylinder engine.

CONTINUED

New U. S. Small Cars

How They're

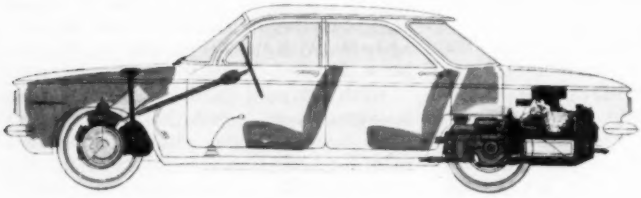
CORVAIR

THE Corvair is the first important U. S. car to offer independently sprung rear wheels.

Its rear suspension is a "swing-axle" type. Separate axle shafts run from the differential to each wheel, and each half-shaft is driven individually through U joints. Each axle, and the wheel attached to it, is thus free to swing up and down independently.

Unsprung weight cut. This makes for good riding comfort. So does the fact that the differential and final-drive gearcase are rigidly mounted to the sprung mass of the car. This big hunk of metal doesn't bounce up and down with the wheels, accentuating every road shock.

The Corvair's body is carried on four coil springs. With the engine at back, there is no need for a drive tunnel. There is just a small floor hump for engine and transmission controls.



PROFILE VIEW shows that head room, leg room aren't skimpy in the rear-engined Corvair. Despite car's low height, ground clearance is six inches, same as standard Chevy's.

FALCON

EXCEPT for its unitized body, design of the Falcon is conventional. Its front wheels are suspended independently, by coil springs. Semi-elliptical leaf springs are used at the rear with the usual solid axle.

The front suspension is set up so that it resists nosedive during severe braking. The rear springs are mounted asymmetrically, with the axle located forward of the center point, to reduce the tendency of the springs to "wind up" when the car is accelerated.

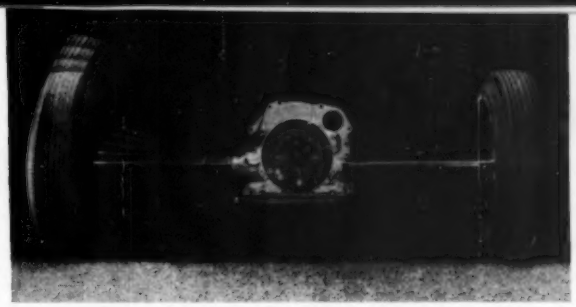
The frameless body has rocker panels and other underbody box sections made of galvanized steel to prevent rust.

All fenders bolt on, so that replacement is simple and relatively inexpensive.

The roof shape, with its two-directional crown and short length, has permitted the elimination of roof supports. Result: a low roof line with no sacrifice in head room.

FALCON IS COMPACT, but it isn't tiny. Big door openings make getting into the car easy.

Built

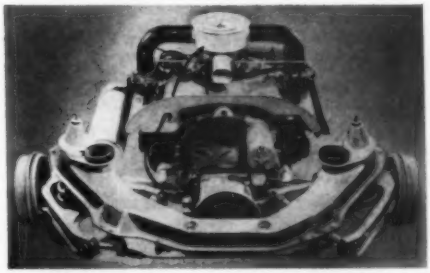


CORVAIR REAR WHEELS are each independently sprung, move up and down freely.

Unit body. The Corvair body is fully unitized and frameless. But unitized cars are highly vulnerable to corrosion. If one panel is weakened by rust the entire structure is weakened. Chevy is guarding against this by coating principal underbody structures with a high-zinc-content material prior to assembly, then painting all undersurfaces after assembly.

The Corvair passenger compartment is quite spacious, considering its compact size. Three average adults can be seated front and rear with a little squeezing.

Baggage space is tight. The front storage compartment has a total capacity of 9 4/5 cubic feet, meager in comparison with the cavernous trunks Detroit usually provides. Its shape, and the way the spare tire is stowed, further reduce its usefulness. A convenient storage well behind the rear seat adds an additional 4½ cubic feet. And an optional folding rear seat provides, when folded down, a flat-floored cargo area of 10 2/5 cubic feet inside the car.



COMPACT: Engine, rear suspension and drive train of the Corvair are all in one unit.

LEAF SPRINGS, angled shock absorbers like those in bigger Fords are used in Falcon rear suspension, shown at right. Tires are low-profile 6.00 by 13.

STABILIZING STRUT at left looks like torsion bar, actually forms, with the stamped suspension arm, lower "A" frame of front suspension.

Good trunk space. The Falcon's trunk has a capacity of 24.5 cubic feet, more than double the volume of the Corvair's front trunk and about 20 percent more than the average of the most popular foreign cars. It will hold enough luggage to satisfy two-week vacation needs for the average family.

Small 6.00-by-13 tires require less wheel-housing space than larger tires used on big cars, leaving more room in the passenger compartment and up front in the engine room. They require a smaller turning radius, too. They are the low-profile tubeless type, and recommended pressure is 24 p.s.i. front and rear.

CONTINUED

New U.S. Small Cars

What's Good...

CORVAIR

IT HANDLES nicely. Both the manual and automatic transmissions are smooth. The car keeps its feet in hard turns.

The traction is outstanding.

The entrance room is splendid. So is the head room. Front doors have no knee-cracking dog-legs.

The thinned-down doors are solid.

The floor is almost flat.

That fold-down rear seat will delight the shopping housewife.

There's no grille to collect bugs, no radiator demanding antifreeze.

The asbestos-wrapped muffler, close to the engine, is kept warm and dry. This should prevent rust.

The permanent, cleanable air filter is a blessing.

The passenger-compartment heating unit provides incredibly fast warmth.

FALCON

THE engine is reassuringly familiar. For cast iron, its weight is low.

The suspension's anti-dive is splendid.

The right hand is accustomed to the gearshift-lever location.

The windshield vision is superb.

The seat heights are comfortable.

Those parallel wipers are a boon.

The styling probably will be more acceptable to the Detroit-oriented buyer.

Hooray for optional dual headlamps.

For the car's size, there is ample room for luggage in the trunk.

The bolt-on fenders should be inexpensive to replace.

Most of the servicing items, such as the oil cartridge, are standard size.

The wiring system is simple to service.

That galvanized steel in the structural members shouldn't rust out.

First Details

BACKSTAGE, waiting to make its official bow this month, is a third Big Three small car, Chrysler's Valiant. Here is a lift of the curtain for an advance peek at it.

Its styling is more exotic than that of Corvair or Falcon. It has a subtle continental flavor. Grille and hood are reminiscent of the Chrysler 300E. An embossed wheel design is stamped in the deck lid, à la Plymouth and Imperial.

There are no fins darting skyward. Rear-fender crowns wrap over at the sides. The rear deck slopes off sharply from the rear window, giving the Valiant a semi-fastback appearance. Roof is thin and flat.

Under the sloping hood is a new water-cooled in-line six, tilted 30 degrees from vertical to the right. This accounts for the low hood. It also allows grouping of the engine accessories to the left of the block. Result is a very compact power plant just slightly longer overall than the bare block.

Transmissions are tilted 30 degrees to the left, again to help keep height down and passenger room at the maximum. A three-speed manual transmission with shift lever floor-mounted is standard; three-speed automatic drive is optional. Unlike Falcon and Corvair, power steering and brakes are also offered.

Generators are a new alternator type, which keep charging even at idle.

Six intake and six exhaust ports—many in-line sixes have just three or four—let the engine breathe deeply. Long-branch intake manifolds have passages of nearly equal length running from the single-barrel carburetor to each cylinder. This means equal fuel distribution, uni-

and Not So Good

CORVAIR

Is THAT slight tendency toward oversteering absolutely inevitable?

The driver has to scrunch around a bit to reach the pedals.

Tire pressures are critical for good handling.

The transmission-mounted gearshift lever is an annoyance to the middle passenger in the front seat.

This is a car you will have to learn to drive—that heavy rear end may tend to break loose faster in turns on ice.

Why didn't they make those valve covers easier to open?

That huge rear window spoils the otherwise fine styling lines of the car.

The engine fan belt, busily turning four corners, may breed trouble.

Isn't that rear storage well, if piled high with stuff, a collision hazard?

FALCON

Tsk, tsk! With the horsepower so modest, let's synchronize that low gear.

The steering is overslow. More than 4.5 turns lock-to-lock is ridiculous with that light front end.

Good low-end torque has been sacrificed to a questionable speed advantage.

The axle ratio at 3.10:1 is too low. It should be 3.31. Fuel economy around town wouldn't be affected, and at high speed it wouldn't cost one m.p.g.

Those 13-inch tires will wear faster.

Bore and stroke, while affording low friction, give poor thermal efficiency.

Must an "economy" car offer that long list of options—at extra cost?

Why aren't the rear cushions, like the front ones, foam-filled for comfort?

That ribless roof, plus thin pillars, might be a hazard in a roll-over.

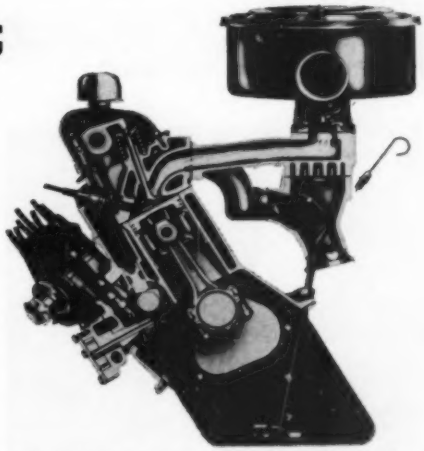
on Valiant

form power impulses for smooth operation and high efficiency.

Engine displacement is about 170 cu. in. Stroke will be slightly greater than bore to furnish good low-speed torque.

Performance will be "between our 1959 Plymouth L-head six and standard V-8 models," according to company engineers. That should mean acceleration from zero to 60 m.p.h. in about 16 seconds, cruising speed in the 70-75 m.p.h. range, and maximum speed of about 90 m.p.h. Fuel economy target is gas mileage falling between Volkswagen and Rambler Six.

Wheelbase will be the shortest of U. S. compact models, 106½ inches. Overall length, 184 inches, is greater than Falcon or Corvair. Height is 54 inches; width, 70.1 inches. Valiant station wagons will have the same dimensions.



CUTAWAY VIEW OF VALIANT ENGINE shows how the new in-line six is tilted 30 degrees from vertical. This keeps engine height low. It also permits the use of long intake manifold pipes—which give mild supercharging effect and help even out the fuel distribution.

For details on some of 1960's big cars, see the following pages

Pontiac for 1960:

Better rear suspensions boost stability of wide-tread chassis. Some V-8s have more power

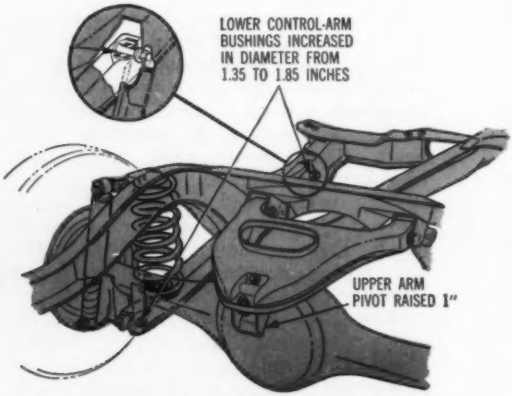
THE addition of two- and four-door hardtops in the new Ventura series brings to 16 the number of Pontiac models for 1960.

All have the "Wide-Track" chassis that Pontiac first introduced last fall—but with several improvements.

The upper control arm of the three-point rear suspension has been raised an inch (see drawing below). This raises the roll center, placing it closer to the center of gravity. Resistance to body sway and lean, already good because of the wide tread (63.7 inches front, 64 inches rear), is improved.

Shock absorbers are new. They have nylon-sleeved control pistons and use a variable-viscosity fluid for more uniform rebound control at varying temperatures.

POPULAR ECONOMY V-8 with 8.6:1 compression ratio, two-barrel carburetor is continued as an option. A 2.69 axle ratio is offered.



LARGER RUBBER BUSHINGS are now used at pivot points of the rear-suspension lower-control arm to provide a smoother and quieter ride.

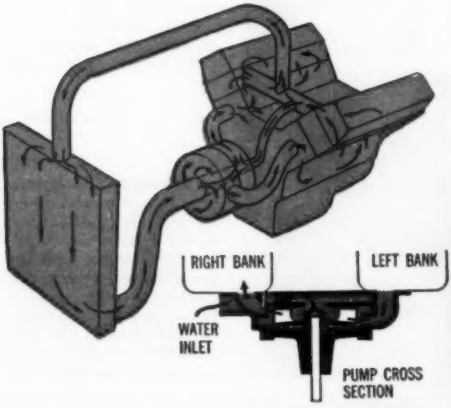
NEW VENTURA SERIES is priced just above Catalina hardtops (left). Grille (above) is reminiscent of classic Cord. Twin cones replace 1959's Vee fins atop each rear fender.

Economy Plus Style

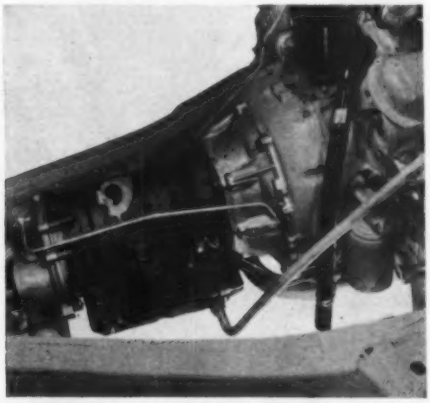
A wide range of engine choices, all based on the same 389-cubic-inch block, is again offered. You can get two-barrel carburetors. Compression ratios and horsepower range from 8.6:1 and 215, for so-called "economy V-8s," to 10.75:1 and 318, for the hottest V-8.

You can use regular gas in the former, and probably will need super-premium fuel for the latter. In between come engines of varying power ratings with 10.25:1 compression that want "plain" premium gas. Notched pistons provide adequate valve clearance in the higher compression engines.

By permitting a smaller drive tunnel, the redesigned Hydra-Matic increases passenger space by 444 cubic inches—a figure that sounds more impressive than it is. The hump is an inch lower, two inches narrower. Of equal practical value is an increase of more than an inch in the distance from steering wheel to seat cushion, giving the driver more clearance.



NEW DIVIDED-CHAMBER WATER PUMP distributes coolant equally to both cylinder banks. This helps to prevent hot spots in the engine.



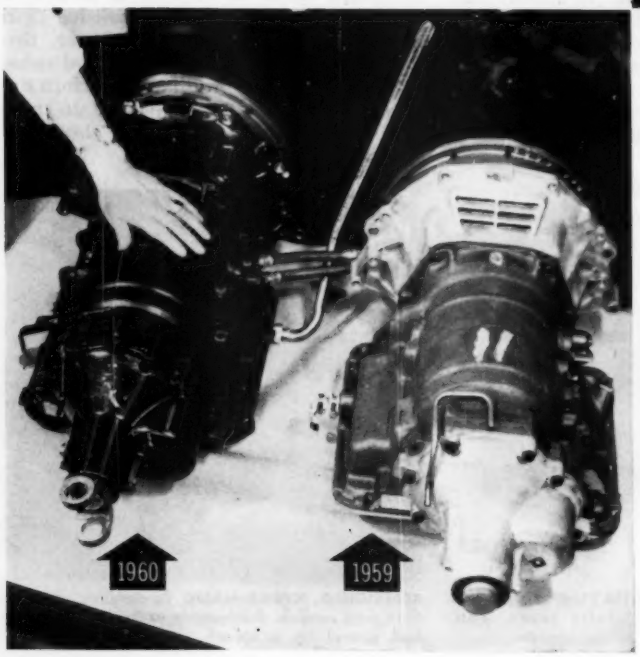
REDESIGNED HYDRA-MATIC is smaller, lighter than past models. Linkage is protected from ice and gravel by a splash shield (not shown).

CONTINUED

Olds Cuts Chrome,

"98" SERIES (left) at 220.9 inches is 2.1 inches shorter, .1 inch higher. The stern is prettier. Except for the roof, sheet metal on the car is all new.

SPORTS SEDAN (above) like the rest of the new Olds, rides more softly —the result of a program on body mountings. Rear doors open wider, give five more inches entrance room. Axle ratio on "98" is 3.23:1, down from 3.42 in '59; and Super's is 3.07, down from 3.23.



HYDRA-MATIC transmission was slimmed down by reducing projections in valve body and hand-control linkages at sump line. Machinery remains unchanged. The weight is reduced by 11 pounds to 229 pounds. It also uses two quarts less oil —now 9.5 quarts.

Horsepower and Hump

Demure in styling and a smidgen shorter, the 1960 version steers more easily, has a new-fangled headlight dimmer and comes with an engine that's less finicky on fuel

WHEN the Oldsmobile people were putting the final touches on their 1960 automobile designs—that was last winter—they fell to mulling over the plight of the U. S. motorist at the gas pump. With higher taxes and all, filling the tank just about cut a $10 bill to ribbons. So they decided to do something about it.

Beginning late last month, you could, for the first time in 11 years, buy an Olds that uses regular fuel. Depending on the difference between regular and premium in your area, this can save you up to four cents a gallon.

That was not all that turned up on the design boards. The new Oldsmobiles:

- Have smaller transmission tunnels bulging into the floor.
- Offer a new-fangled automatic headlight dimmer that, working in two stages, says twice to an oncoming car, "Okay, Bub, lower 'em."
- Steer more easily in the non-power versions.
- Are in brand-new dress for the third straight year.
- Are a smidgen shorter.
- Have rounded-off front bumpers for easier parking.

First off, about the engines. For the 88 series, it's the same block, with the same-size piston holes. But the compression ratio is dropped to 8.75:1, as against 9.8 in '59. Horsepower, of course, is down, from 270 to 240, and the torque from 390 pounds/feet to 375. To retain performance, the engineers did some fiddling with the cam. There is less overlap between intake and exhaust valves. That helps torque at takeoff. Low-end performance remains fine, but the engine doesn't have the steam that it did above 70 miles an hour.

Another trick, as old as the automobile business, was introduced for motoring economy. The axle ratio was reduced from 3.08 to 2.87, so the engine turns fewer revolutions per mile. As a result,

[*Continued on page 248*]

The Chrysler Family

This company's bag of surprises includes two new brands of cars, new engines, unit body construction and rustproofing

THE Chrysler Corp. last month loosened the drawstrings on a sackful of goodies in its 1960 cars. These were the chief ones:

Two brand-new lines of cars, a smallish, "compact" vehicle called the Valiant that's two feet shorter than the Plymouth (see page 120), and one of "normal" size, called the Dart.

Two new, different-sized six-cylinder engines that lie over on their sides, 30 degrees to the vertical. Their intake manifolds are cast aluminum.

A series of V-8 engines with a fresh idea in intake manifolding—carburetors at each side of the block and long, ram's-horn intake manifolds that produce 15 percent more power.

"Unit" body-frame construction to eliminate the squeaks and rattles that come with age.

A method of rustproofing sheet metal, permitting the boast that "corrosion has been conquered by the Chrysler Corp."

That's not nearly all that popped out of the sack, but it's enough for a starter.

A Plymouth-sized newcomer. The Dart—by Dodge out of Plymouth—comes powered with either of the new overhead-valve sixes that list to starboard, or with a regulation V-8. A cynical eye will discover that the Dart is about the Plymouth's size and that some of its sheet metal looks like the Plymouth's, as indeed it is. The prices of the two cars look much the same, too.

But the Dart is a brand name in its own right, with all the available accessories in the alphabet, from A for Air Conditioning to S for Swivel Seats.

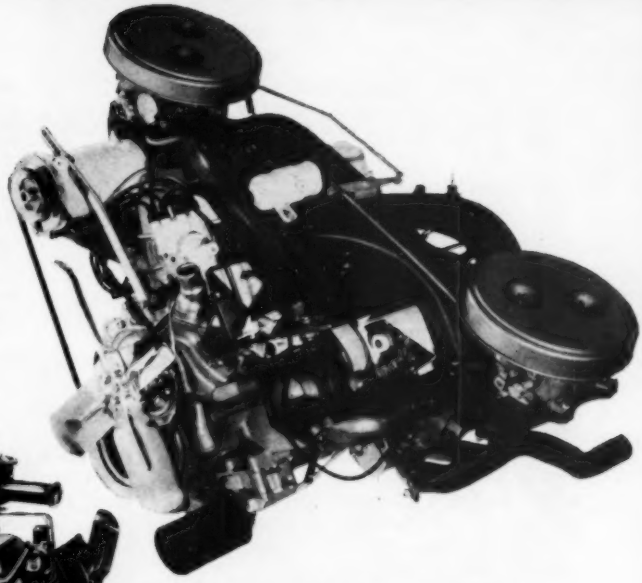
The new six-cylinder engines are the first valve-in-head sixes ever produced by the corporation. They replace the old flat-heads that, at one time or another, have powered the Plymouth, Dodge, De Soto and even the Chrysler Windsor. They will be available in the Valiant and Plymouth as well as in the Dart. Dodge is sticking strictly to V-8s for 1960.

The engineers are at pains to explain the advantages of tilting the block: It allows a lower hood, drops the center of gravity, shortens the engine by moving the water pump from the front to the side, and permits the use of an elaborate intake manifolding to give the cylinders an identical fuel diet. Both new engines use the same block. One simply has a bigger bore and longer stroke.

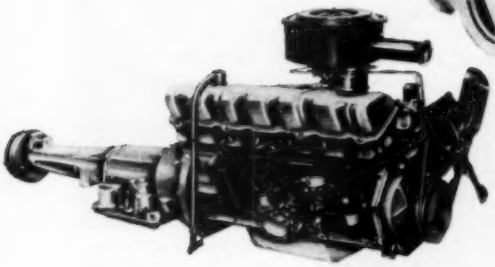
Power from organ pipes. For 1960 Chrysler has come up with V-8s of unusual behavior. Step on the gas anywhere between zero and 100 miles an hour and you experience an extra surge of power

NEW IMPERIAL, with its familiar gun-ring tail lights, is first of company's cars to be announced. Remainder will appear during October. Imperial's hood lines are longer. Sheet-metal "sculpture" extends almost full length of car. All the cars have better front entrance room because much of jog has been removed from windshield pillars. From front, new Valiant, De Soto, Chrysler tend to resemble "300" series. Least finny of the cars are Dodge Darts.

for 1960



NEW RAM-AIR manifolding on V-8 engines (right) increases passing power by as much as 15 percent. Squarish intake tubes, as on this Dodge engine, are Siamese—each pair serves two cylinders. Inside diameters are 1.87 by 1.12 inches. A four-barrel pot is positioned outside each of two cylinder banks. Ram manifolding is silent.



TILTED-BLOCK OHV-SIX ENGINES (left) have a long, aluminum intake manifold branch for each cylinder. They are fed from a single-throat carburetor. Available in Valiant, Dart and Plymouth, engines also use aluminum for distributor, oil- and water-pump housings.

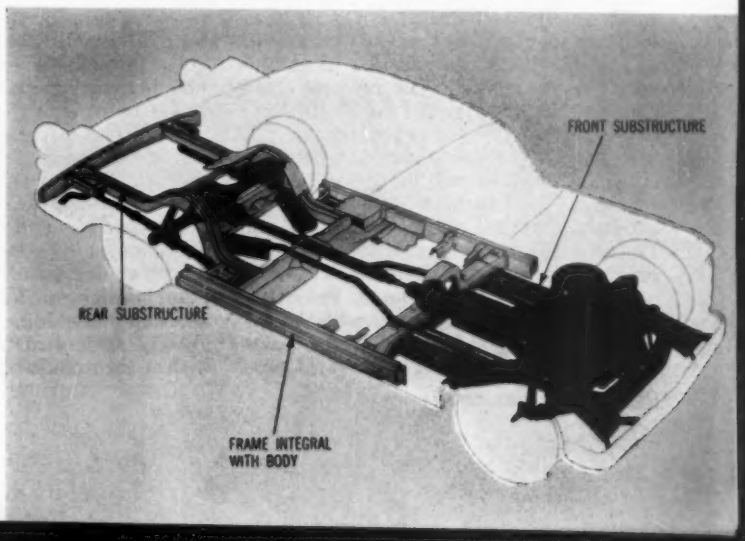
without a down-shift. Part of this is due to 30-inch-long manifold pipes crisscrossing the engine from carburetors to intake valves.

Here's how it works: If you blow into a child's whistle, a sound comes out. That's because the air in it vibrates. The pitch depends on the length and diameter of the tube. That determines its "resonant frequency." Another analogy is the pipes in a pipe organ. The deep-toned sounds come from long, fat pipes, the high ones from short, slender ones.

What you hear is actually a pressure wave, a vibration. It increases the density of the air-gas charge and thus the amount passing through the carburetor, manifold and engine. Result: more power.

Marcelled air. Something like this occurs in all automobile intake manifolds, but to a lesser degree, and, as a matter of fact, in exhaust pipes, too.

UNIT CONSTRUCTION locks body and frame together with 5,000 welds. It's modified, however, by addition of a bolted-on beam substructure to hold front suspension and engine. Six bolt positions are under front seat where frame is joined to an underbody cross member. Four are on brackets that protrude from cowl panel. Combination frame-body permits higher, wider doors. Plastic collars enfold instrument-wire holes in firewall to stop drafts.



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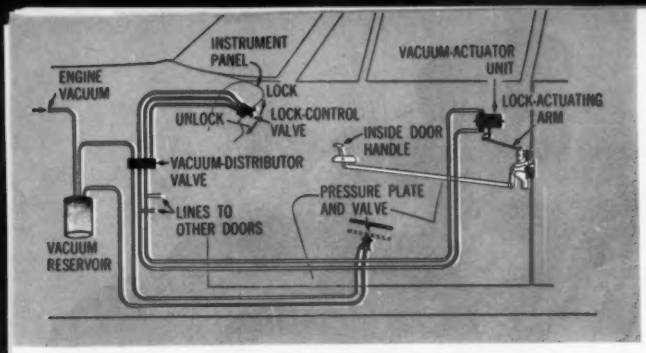
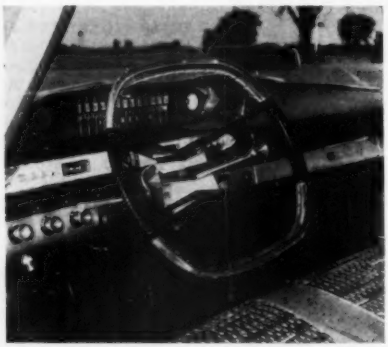


SELF-LOCKING DOOR MECHANISM looks about as complicated as it actually is. Valve on instrument panel is master control. With valve in "on" position, engine vacuum is supplied to vacuum-actuator units in doors. Each unit pulls an arm, locking doors. Pressure-plate switch under driver's seat prevents doors from locking when driver leaves car with engine running. Doors can be unlocked by handle inside or with key from outside.

What Chrysler has done is set up a controlled pressure wave in its intake manifolding to emphasize the phenomenon. Diameter and length of the tubes tell the story. The engineers figured out that a 30-inch tube with a 2½-inch i.d. would create a pressure wave—boosting the fuel-air charge along from carburetor to intake valve—with a resonant frequency of 23½ times a second. That's exactly the number of times that Chrysler's V-8 valves open each second at an engine r.p.m. of 2,800. And it's at 2,800, at full throttle, that the engine produces its greatest torque.

The wave pushes two pounds of extra pressure into the cylinders under these conditions. This "supercharges" the engine.



SQUARED-OFF AT TOP AND BOTTOM, special Plymouth steering wheel is standard item on Fury models and those with power steering.

Bore, stroke and valve size seem to have little to do with the system's success. The 30-inch tubes work equally well throughout the Chrysler Corp.'s entire spectrum of V-8 engines.

The inevitable question is, does this semi-supercharging occur only at 2,800 r.p.m.? No, it doesn't. In diminishing degree it affects power output over a range of 1,200 r.p.m. above and below it.

Ram induction will be an option on Plymouth 361-inch V-8s, the Dodge Phoenix Matador and Polara V-8s, and De Soto Adventurers. It will be standard on Chrysler "300-F" models.

Bodies without skeletons. Frameless construction is an old story with American Motors' Ramblers and Ambassador. The Lincoln and Ford Thunderbird (and Corvair and Falcon) have it. But it's new in Chrysler products.

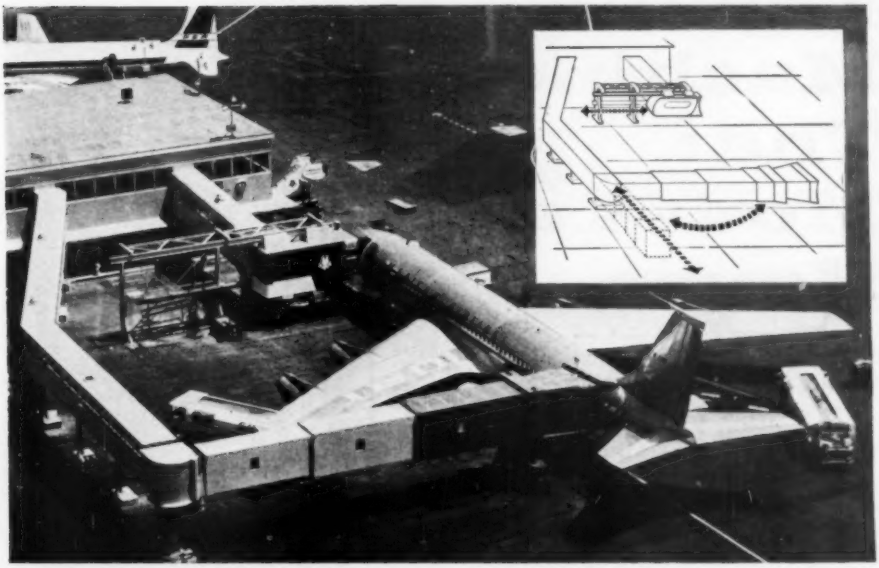
Chrysler has its own version of it, too. The separate frame is almost, but not quite, eliminated. For the engine and front suspension, there is a "substructure" of steel beams to carry the weight. Other unit-body manufacturers weld this to the body. Chrysler bolts it.

In the laboratory the unit body has proved to be a lot more stubborn to twisting and fore-aft bending.

All Chrysler Corp. cars except one—the Imperial—will have unit bodies for 1960.

And drip-dry sheet metal, too. American Motors, Lincoln and Thunderbird all immerse their bodies in primer paint. Chrysler now has gone whole hog with the idea. Arriving from the steel mill, the body metal is washed and coated with a cleaning compound. Stamped and welded into a body, the vulnerable bottom 18 inches then goes through seven stages of baths—washing, rinsing and coating with a gray prime paint that's allowed to dry. And then it goes through seven finishing stages of priming, baking, sanding and enameling on the outside.

Chrysler's sack of surprises contains numerous other developments. Among them are seats that are higher off the floor for better leg posture, a new windshield pillar design to lessen the chances of kneecap cracking, and an alarming, ghostly system of locking all the doors with a turn of the ignition key.



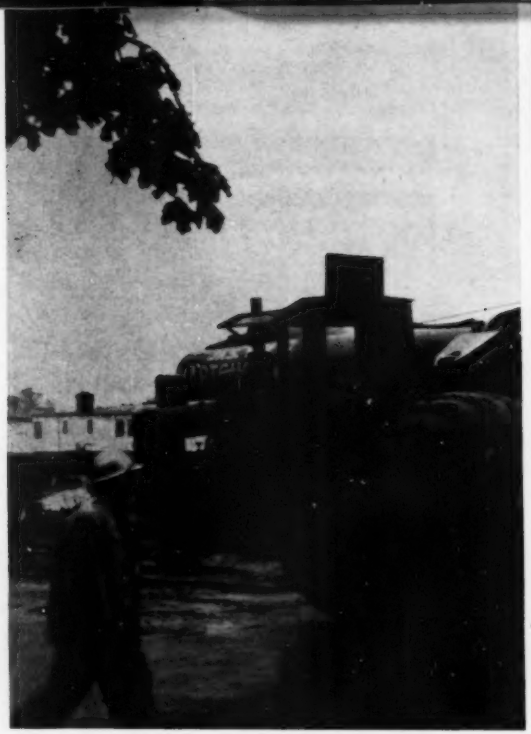
COVERED CORRIDORS. Passengers using American Airlines 707 jetliners at San Francisco are breaking in a new loading system. To clear the big plane just before departure (see diagram), the telescoping tail-door section contracts and pivots out. The nose-door bridge rolls back on an overhead monorail.

TONY TRUCK. A fancy sports top that fits on its "wideside" pickup truck is being offered by GMC for $500. Lightweight aluminum enables it to be easily hoisted on or off for quick conversion. The hardwood-paneled interior has two bunks. A lift-up rear door provides sunshade. Windows have Venetian blinds.

The Machine That Moves a House

By Erik H. Arctander, with photos by W. W. Morris

WHEREVER they're moving houses by the hundreds you will probably see a *Machine*. Only two exist and both are owned by James W. Hartshorne, veteran house mover of Moorestown, N. J. He and maker R. G. LeTourneau designed them. Teamed up with a trailer, the Machines transplant houses as heavy as 200 tons—saving a day's work on each one.



All arms and no body, U-shaped Machine backs

Steel beams shoved through the foundation walls and crisscrossed

1 **DIRT IS DOZED AWAY** from the front, sides and back of the foundation. Holes for the beams are sledge-hammered through the walls.

2 **LIFT BEAM GOES IN FIRST,** under back part of house. The double-web I-beam slides into place on rollers atop cribs of rail ties.

around home in way of Queens, New York, expressway. Seventy-ton house is 21 by 43 feet.

under the house form a carrying platform

3 **FOUR 60-FOOT "TRACKS"** slide under house from front to back. A pair goes under each side; they rest on the lift beam and cribs.

4 **"CROSS STICKS"** span width of house every four feet. The wood 12-by-12s and 12-inch steel beams rest on tracks; are wedged tight.

CONTINUED

The Machine hooks up to the lift beam and tracks, picks the house

5 BACKING AROUND HOUSE, each rear wheel rolls on a level path of rail ties. These spread weight carried by the 30.00-by-40 tires.

6 MACHINE HOOKS ONTO LIFT BEAM with four-sheave blocks suspended just beyond rear wheels. Electric winches handle one-inch cable.

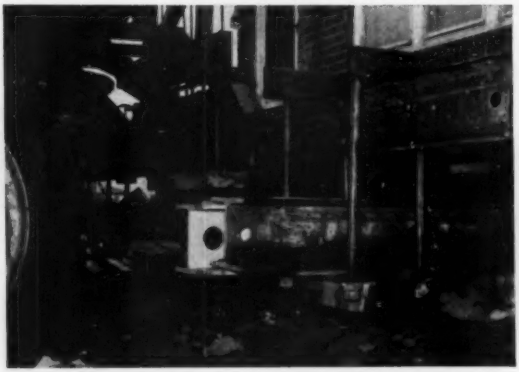
9 MACHINE TURNS sharply into narrow street by pivoting its two-wheel power unit. A 300-hp. diesel is geared down to give a top speed of 14 m.p.h. Because of this and excessive width, Machine stays off highways. It's shipped in six pieces on trucks and flatcars.

After a two-mile trailer trip through city streets, the house is set

11 ESCORT for the trip includes two linemen in trucks to clear phone wires and two police cars. Another cop and two movers walk.

12 SECOND MACHINE LIFTS HOUSE off the trailer at new site. The thin brick veneer, considered tricky, came through uncracked.

off its foundations and carries it to a trailer



7 YOKE ON THE FRONT of Machine picks up the two pairs of tracks. A sling of bolts and angle irons is slipped underneath each pair.

8 LIFTING THE HOUSE off its foundations, Machine raises the lift beam first and then tracks. House was carried off tilted forward.

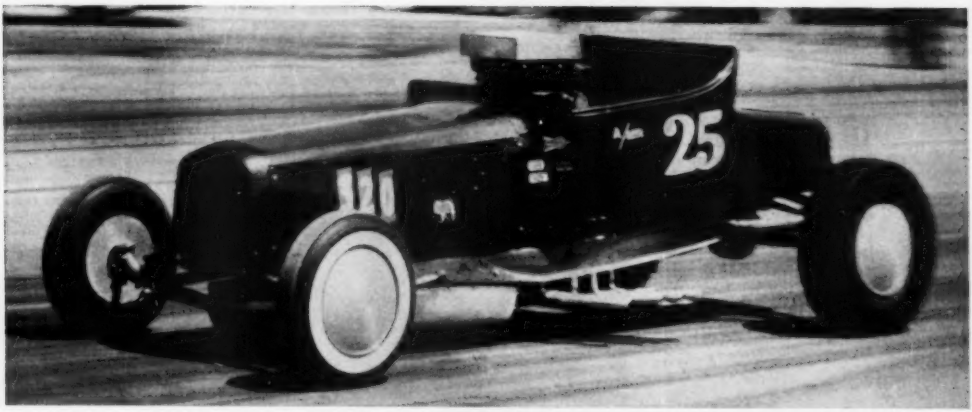
10 TRAILER PULLS UP behind Machine to take the house from it. The trailer's "horse" is unhitched and moved out of way. Then Machine backs over trailer bed, lowers the house onto it and drives off empty. Finally, horse is hitched up again. Transfer took a half-hour.

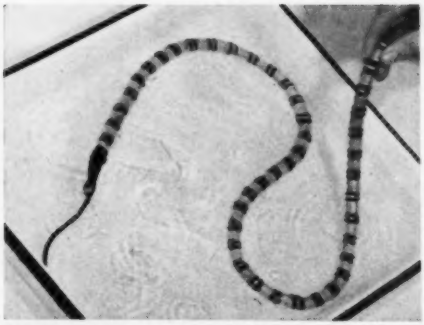
on new foundation by a second Machine

13 NEW FOUNDATION has slots in its walls into which the Machine can lower the lift beam and tracks. Cribs take the weight.

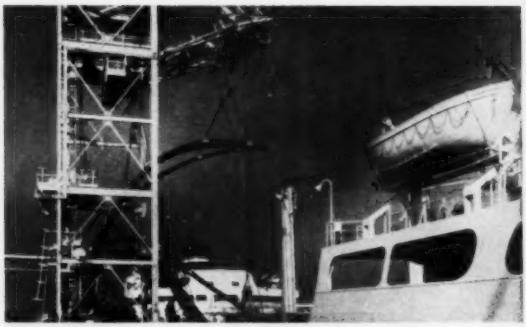
14 MOVERS LEAVE BEAMS until the masons build up foundation walls with block. Tenman crew did the moving job in three days.

SUPER RIFLE. Here is America's first rifle since 1916 designed exclusively for international shooting competition. It was built by Winchester for next year's Olympics, costs $3,500, won't be mass-produced. It's a single-shot, .308-caliber rifle with no safety or ejecting mechanism. Its "free-floating" barrel and double-set trigger add to its reliability. In tests at 200 yards, it has hit 10 bull's-eyes in a row with a shot-group spread under 1½ inches. A .22 is also being produced.

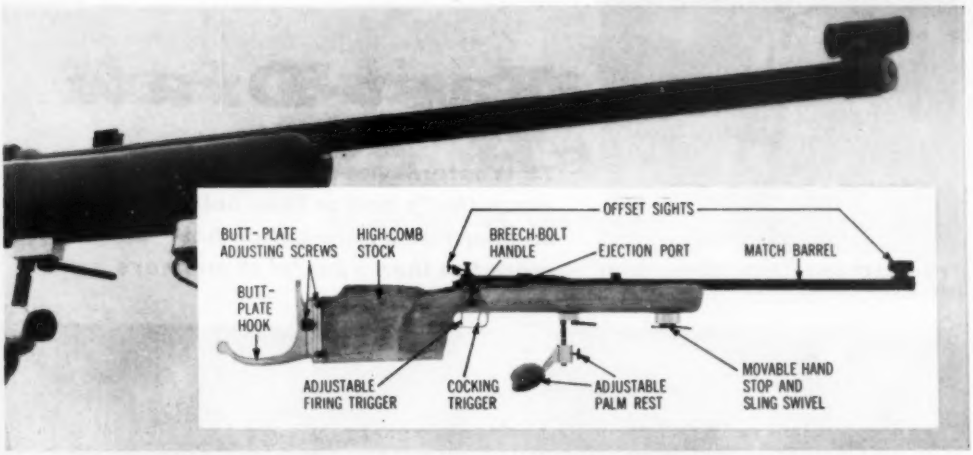


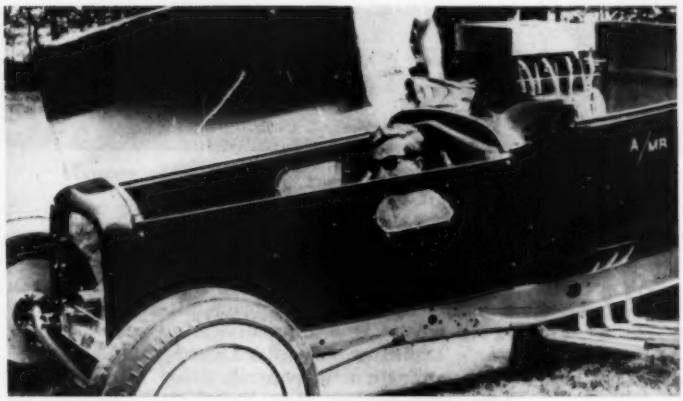


SIGNAL SNAKE. Spliced into an underwater cable, this "electric-eel" battery powers repeaters that boost voice and teletype signals. Developed by the Army Signal Corps, the zinc-silver chloride units are activated when immersed.



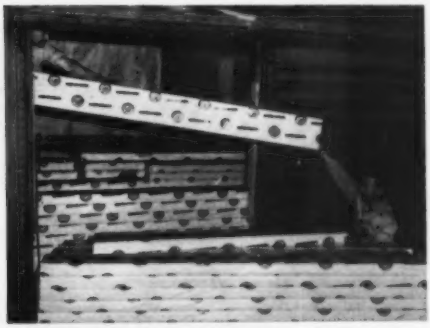
OIL UNLOADER. A new dockside crane speeds the transfer of crude oil from tankers to the Esso refinery at Fawley, England. The boom above is positioning a 10-inch suction hose to the deck coupling. Air motors reduce fire hazards.





HEADLESS ROD. If you think the car at far left is doing 118 m.p.h. on a drag strip without a driver, you're wrong. It is doing 118, all right, but the driver, Don Mitchell of St. Louis, Mo., is under the hood, as shown at near left. He sees the road through a windshield (which replaces the radiator) and small windows at the sides. It's a converted 1923 Model T Ford with an air-cooled '51 Chrysler engine on the driver's seat.

SUN AND EARTH. This is the first photo showing the sun and the curvature of the earth on the same film. It was taken 300 miles in the air. The camera was in the nose cone of an Air Force Thor missile on a flight from Cape Canaveral.



PACKAGED LUMBER. Now they are wrapping premium lumber—to keep out moisture and dirt, prevent scars. The paper, a polyethylene-coated kraft, is lightweight and takes little space. It's made by Crown Zellerbach, San Francisco.

TV'S WYATT EARP, Hugh O'Brian, claims television's fast-draw title. Time: 3/5 sec.

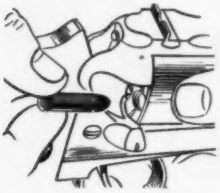
Fast-Draw

TV Westerns have started a national craze that's hotter than hula hoops, as phony as a nine-gallon hat—and more fun than a barrel of monkeys

Modern gunslingers, who could outdraw Jesse James, fire in 20/100, or one-fifth, of a second.

HOTTER than a pistol these days is the handgun business. An estimated half-million Americans have taken up the quick draw as a hobby, most of them using new .22-caliber revolvers artfully made to resemble the weapons carried by the Wyatt Earps and Paladins of TV.

Already this fast-growing fad—and the accidents that have accompanied it—have brought cries of protest. Bills to curb or regulate the sport have been introduced in Congress. One normally dainty woman's magazine recently kicked up its bloomers in an article angrily titled "This Very Day a Gun May Kill You." De-



SINGLE-ACTION COPY faithfully reproduces early method of inserting cartridges, one at a time, through "loading gate." This is Sturm, Ruger's .357, also available as .22.

DOUBLE-ACTION gun has swing-out cylinder, permitting fast loading and simultaneous ejection of all shells. This is High Standard's unique nine-shot "sixgun."

Fad Brings Boom to Handguns

By Sheldon M. Gallager

Photos are from forthcoming book, "Slapping Leather," by famed film coach Rodd Redwing.

ploring the rapid rise in gun-toters and the "mayhem and murder likely to increase," the article called the "dangers of these weapons . . . a national emergency."

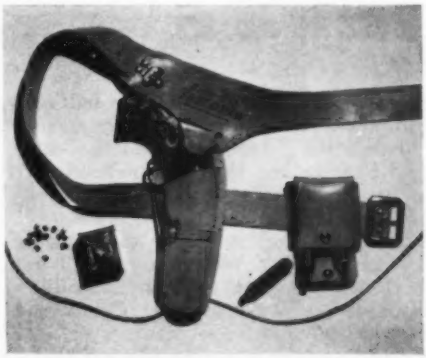
Emergency or not, the fast-draw fad is galloping across the nation like Western sagas across the TV screen. Today, Western-style sixguns are selling at the rate of 150,000 a year—nearly 3,000 a week. There are, in fact, more sixguns in use now than in the days of the Daltons.

Colt, originator of the famous "Peacemaker," did its biggest business in the 1880s when it sold a mere 8,000 guns a year. By the late 1930s, Colt's Peacemaker sales had dwindled to about 300 a year, and in 1940 it stopped production.

The stampede is on. Today, fast-draw clubs with such names as the San Bernardino Thumbusters and the Hangtown Gunslingers hold weekly "shootdowns" using near-identical copies of the historic Colt. Such clubs now number as many as 800, with up to 300 in California alone. A recent meet in Las Vegas drew an estimated 12,000 spectators.

In their eagerness to improve their art, fast-draw fans and target shooters may burn up 20,000 to 100,000 rounds of ammunition in a single contest. Winchester, eyeing this booming market, has just announced a new souped-up .22 cartridge, the .22 Magnum. It's designed to give the range and accuracy of expensive center-fire cartridges at a modest price.

The sixgun has a special charm despite



GAS-POWERED GUNS are used in many fast-draw meets for safety: Force of blast will trigger timers without requiring live ammo. Crosman sells this .22 model for about $18, holster for $7.

CONTINUED

Can You Tell Which of These Sixguns Is Real?

Only one of the guns below is an original Colt. Others, in scrambled order, are: Colt's modern .22 copy, High Standard's nine-shot .22, Crosman's gas-operated pellet gun, and an authentic-looking cap pistol copyrighted by Colt. See answers below.

ANSWERS: 1. Original Colt .45; 2. Crosman gas gun; 3. High Standard; 4. cap pistol; 5. modern .22 Colt.

its apparent limitations. Of the half-million now in use, many are of the ancient "single-action" type. As with the early Colt Peacemaker, they can be fired only by first cocking the hammer before pulling the trigger.

Sturm, Ruger, watching the growing popularity of TV Westerns, brought out in 1953 the first modern .22-caliber single-action. Two years later, Colt copied its own Colt in a .22 version.

Just last year, High Standard pulled a switch on history with a Western-style .22 that looks like a single-action but actually works like a modern double-action revolver. You can fire it either by pulling the trigger *without* cocking the hammer, or in single-action style by cocking the hammer first.

Called the Double-Nine, it also squeezes nine .22-caliber cartridges in the space of a normal six-chamber cylinder, thereby making it history's first nine-shot "six-shooter."

Crosman Arms, famous for its gas-operated guns, has also gotten into the act, first with a Western-style BB pistol and just recently with a true six-shot, single-action .22-caliber pellet gun. Both are target-accurate within 25 feet and are classed as real firearms by New York City Police who won't allow them in the city.

Even the kids haven't been forgotten in the current craze. The old 25-cent cap pistol has given way to near-perfect copies of Colts—at $5.

How fast is "fast"? One of the oddities of the fast-draw fad is that, while inspired by the Wild West, it is as phony as a dude in Texas high heels. With few exceptions—like Ed McGivern, who could hit a playing card five times at 15 feet in 2/5 of a second—most experts agree the average Old West cowpoke couldn't hit the broad side of a barn in a quick draw.

The real Wyatt Earp, in his biography, punctures the fast-draw myth by claiming that the best guns took time to get off one well-aimed shot while their opponents pumped two or three misses at them.

Today, there is little doubt that modern gunslingers can outdraw their Western ancestors. While no one has yet equaled McGivern's feat, it is not unusual to find men who can draw and hit a target in 1/5 of a second, or who can draw and fire in 1/10 of a second. Others can get off as many as six shots in a single second by "fanning" the hammer.

How they do it. Few of even the most competent fast-draw fans dare use live ammunition because of a curious quirk: Most people are faster on the trigger than they are on the draw.

Since the single-action revolver must be cocked before it can fire, the first step is to snap back the hammer with the thumb before the gun even clears the holster. At this point, the slightest jar or anxious twitch may fire the gun.

Accidents are often the result, not of

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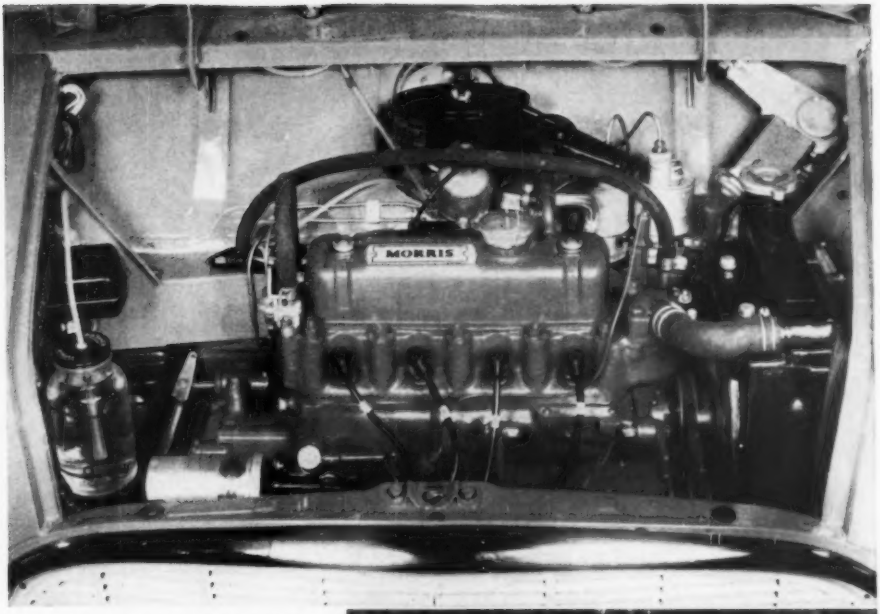
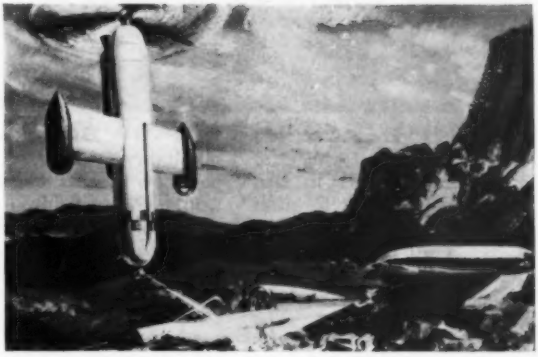
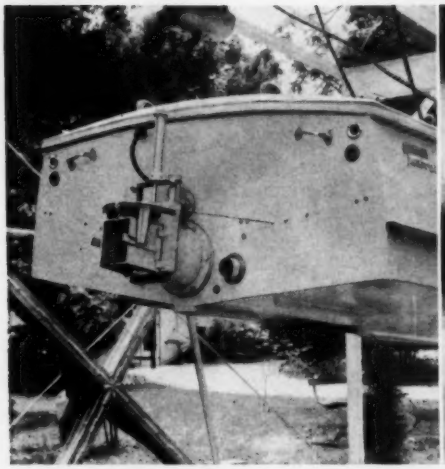


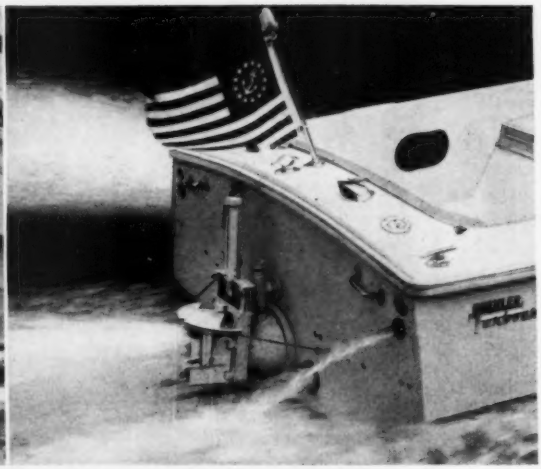
CROSSWISE ENGINE. For more leg room, the British makers set the Morris Mini-Minor's engine athwart the front end of the 10-foot body. Air from the grille is pushed through a side-mounted radiator. The gearbox, bolted directly to the bottom of the engine, doubles as an oil sump. The differential housing is attached to the transmission case. Each wheel is sprung with an inverted rubber cone.

AERIAL SQUIRT. A proposed guided-missile fire fighter would be launched like a rocket, hover like a helicopter, fight fires in crashed planes by pushbutton control from the airfield tower. It could fly five miles in 40 seconds, thrust up its tail and squirt extinguisher on a fire before flames could endanger the passengers. The Firefly, conceived by Solar Aircraft engineers, could be built by modifying existing guided missiles.



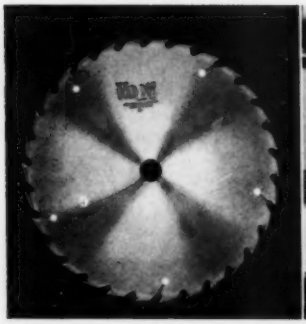
WHAT'S NEW.....





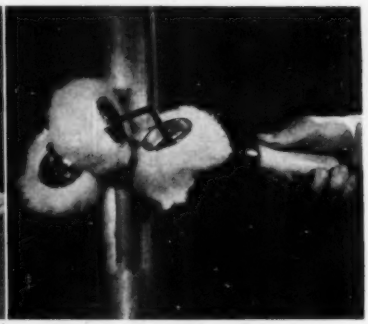
Water Drives Boat Like Rocket

A jet of water, from a turbine pump driven by a gasoline engine, blasts this 16′ runabout along at 36 m.p.h. Shooting out the stern above the water, the jet provides 750 pounds of rocket thrust. With no gear below the hull, the boat can be driven full-speed in less than 3″ of water. It's steered and reversed by two gates, which swivel to deflect the jet stream. Current price tag is $2,900, with other models to come. Turbocraft Div., Indiana Gear Works, Indianapolis, Ind.

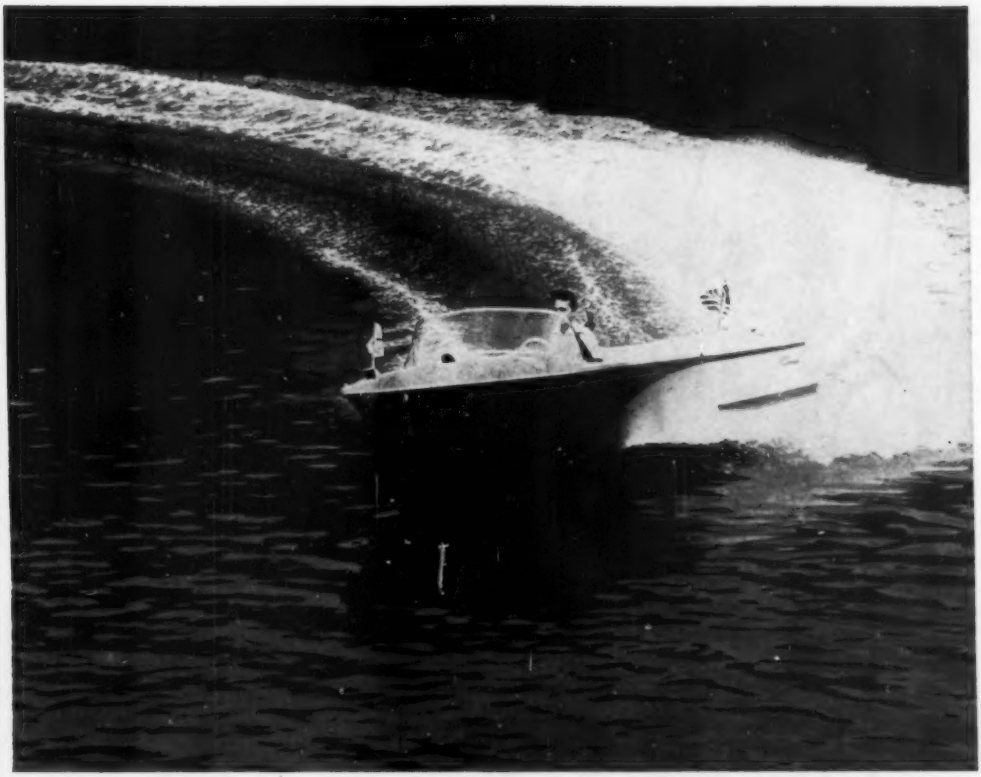


"SILENT" BLADE. Soft copper inserts at the base of expansion slots in this saw blade are said to quiet scream and damp vibrations. The carbide-tipped blades come in rip, crosscut and combination types from 3″ up. Heinemann Saw Corp., Canton, Ohio.

POP-UP BED. You're not likely to oversleep with this new mechanical getter-upper. Plugged into a clock timer or clock radio, the bed automatically pops you up to a sitting position when the alarm goes off. Simmons Co., 1870 Merchandise Mart Plaza, Chicago.



PIPE PAINTER. This four-sided roller is said to paint fence posts, railings and pipe in one stroke—four times faster than a brush. The flexible frame takes diameters ½″ to 2½″. About $5, Speedway Paint Appliance Co., 565 55th St., Brooklyn, N. Y.



LOW-COST WALLS. This extra-heavy perforated hardboard is made for lining garages, shops and tool sheds inexpensively. It's 1/4" thick and comes factory-finished in light blond, with matching-color nails, for 17 to 19 cents a sq. ft. Evans Products Co., Corvallis, Ore.

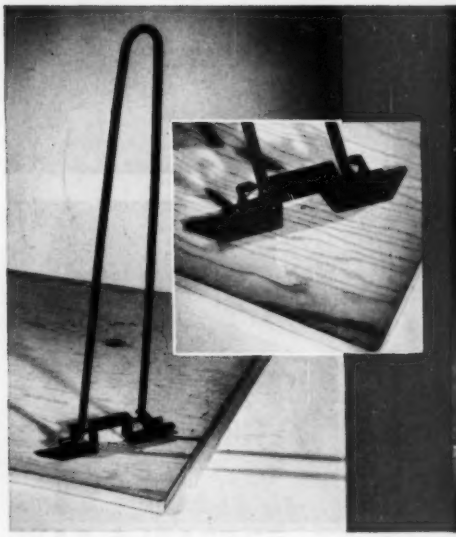
SPLASH DRAIN. Just slip it under the downspout to carry rain water away from the house. The light, 36"-long galvanized troughs can be moved easily for mowing. About $3, New Monarch Machine and Stamping Co., 406 S. W. 9th St., Des Moines, Iowa.

PORTABLE SAW. This one boasts professional-quality features at a price below $40. The 12-lb. saw has a 7" blade and 10-amp, 1½-hp. motor. It cuts two-by-fours at 45 degrees and 2⅛" deep at 90. Thor Power Tool Co., 1421 Barnsdale Rd., LaGrange Park, Ill.

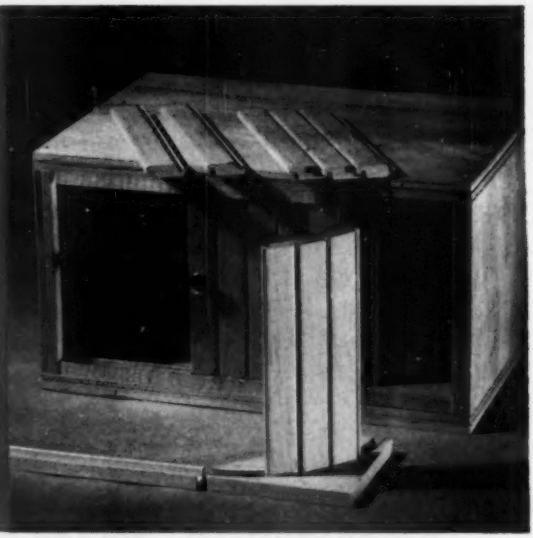
CONTINUED

A Surrey Kids Can Pedal

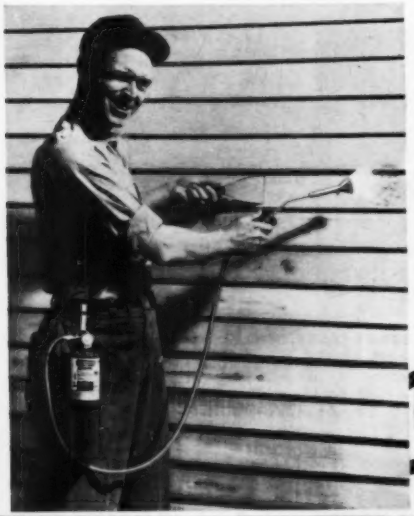
Proof that the "good old days" are also popular with today's young set is this modern pedal-powered version of the surrey—complete with fringe on top. The chain-driven two-seater is 55″ long, 52″ high and has automotive-type front-wheel steering. Two models are available, one with the canopy as shown for about $50 and one without a canopy for about $40. Universal Mfg. Co., 415 Hamilton Rd., Bossier City, La.

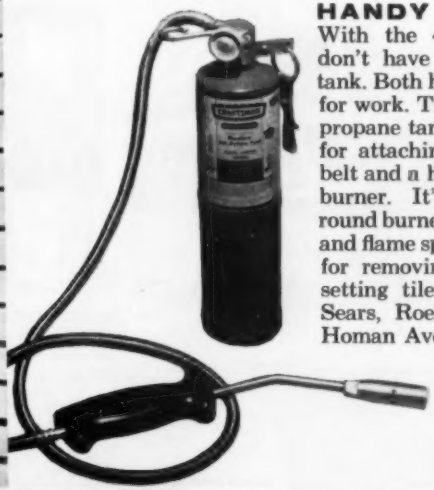


LEGS FOLD FLAT. Popular hairpin legs now come in a collapsible type that makes it easy to store picnic tables, benches and card tables. Squeezing the legs releases or locks them quickly in slotted mounting brackets. Three lengths —16″, 26″ and 29″—sell for up to $16.39 for a set of four. Chas. O. Larson Co., Box 358, Sterling, Ill.



DISAPPEARING DOORS. These interlocking strips let you put together your own flexible tambour doors, usually found only on fancy custom cabinets. The maple strips hook together, require no backing and come 18″ to 48″ long for 24 cents a foot. Straight and curved tracks are also available. M & J Wood Products, 230 Newbridge Ave., East Meadow, N. Y.





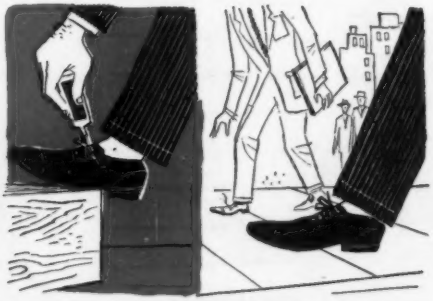
HANDY TORCH. With the 4′ hose, you don't have to hold the tank. Both hands are free for work. The disposable propane tank has a hook for attaching it to your belt and a hanger for the burner. It's sold with round burner tip (below) and flame spreader (left) for removing paint and setting tile. About $10; Sears, Roebuck; 925 S. Homan Ave., Chicago.

RECHARGEABLE BATTERY. By simply unscrewing a cap, it may be plugged into any 110-volt outlet for overnight recharging. Made to fit flashlights using two D-size batteries, it contains two nickel-cadmium cells and a built-in charger. Priced at $7.95, it's said to outlast hundreds of ordinary batteries. Sonotone Corp., Elmsford, N. Y.

CONVERTIBLE PLAYER. Adding a single center post converts this four-speed turntable to an automatic record changer. It plays all record sizes intermixed in any order and both tracks and cycles on only two grams' stylus pressure. A second center post is available for automatic playing of 45-r.p.m. records. United Audio, 202-4 E. 19th St., NYC.

"I'd like to see them make..."

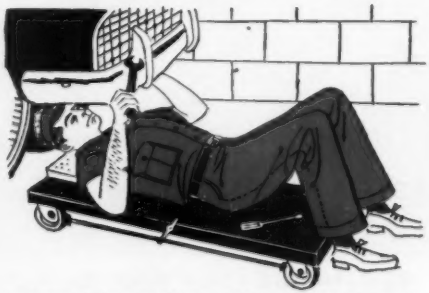
WINDSHIELD GUN PORTS on police cars. Shooting with an arm thrust forward through this opening would be more accurate than leaning out an open window.—*J. F. Adams, Scranton, Pa.*



A SHOE LACE THAT STAYS TIED. Why not impregnate the lace where the knot falls with a small amount of abrasive, or coat it with a no-slip compound?—*Jack DeMent, Portland, Ore.*

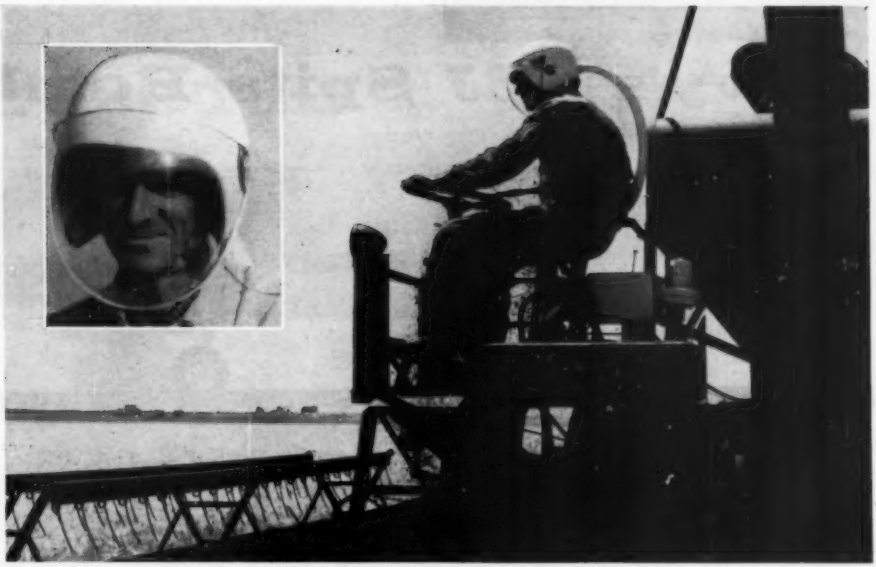
THREADED ARROW SHAFTS to accept different types of arrow tips. This would eliminate the need to purchase an assortment of arrows for various game.—*V. J. Daczynski, Bayside, N. Y.*

A GUTTER CLEANER for ranch houses. A hooked wand on a portable vacuum cleaner would blow away leaves as you walked the length of the low gutter.—*D. Barrett, Wayne, N. J.*



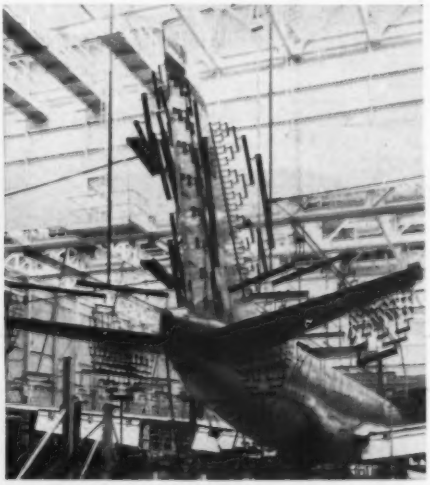
BRAKES ON MECHANICS' CREEPERS. With wheels that could be locked, you wouldn't roll with every little movement while working underneath a car.—*Dale Willhite, Milan, Ill.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE readers. What's *yours?* We will pay $5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.



COOL HEAD. The air-conditioned helmet above keeps an operator of road machinery or other heavy equipment cool in hot weather by enabling him to breathe cool, dry, filtered air. Air is pumped to the fiberglass helmet from a sealed refrigeration unit behind him on the floor. The transparent facepiece is hinged.

BIG EYE. This huge antenna tracks missiles from Cape Canaveral, Fla. It is part of the latest radar equipment aboard the Army's S.S. American Mariner, which sails the Atlantic missile range to provide precise performance data far out at sea.



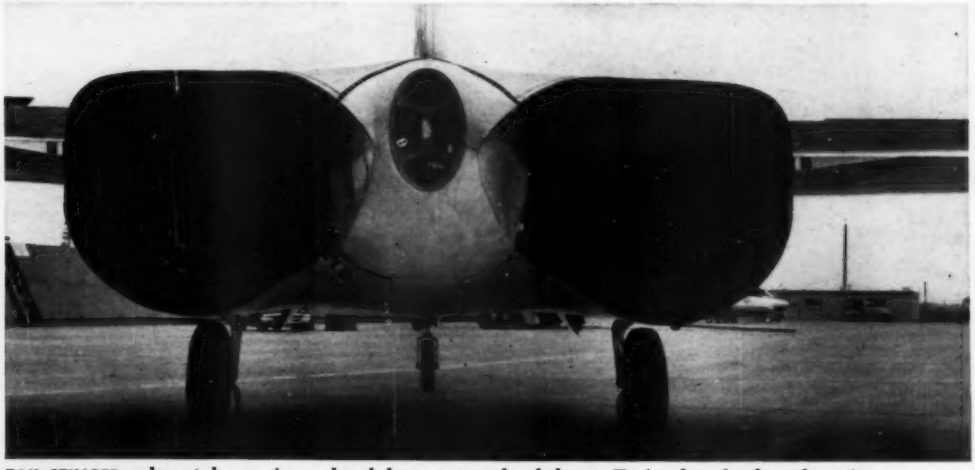
HEAVY STRESS. Here's how they try to break a Convair-880 jet airliner apart. The whiffletrees adorning rudder and stabilizers are attached to surface-tension pads. They transmit 16 tons of pressure from a powerful hydraulic ram.

Navy's A3J Spits Bomb

THE beast of an airplane pictured above is designed for something new in nuclear bombing. Between the two huge jet tailpipes is a hole. An H-bomb can be shot from it, over an enemy target, much like a bazooka charge. The bomb drops straight down because it comes out of the hole at about the same speed the airplane is traveling—said to be 1,400 miles an hour. The airplane's speed and the bomb's speed cancel out.

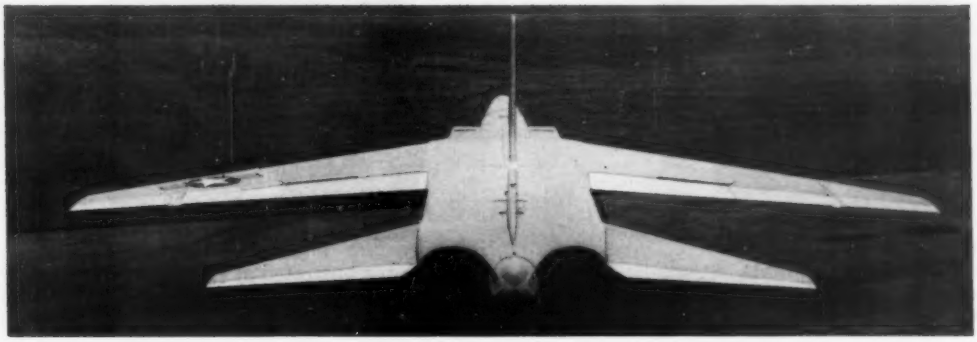
This unique wrinkle in bombing technique gives the aircraft, the U. S. Navy's A3J Vigilante, greater target accuracy.

The A3J has other unusual attributes. Because it has tremendous range, the carrier from which it is launched can sit far outside the patrol areas of defensive land-based aircraft. It can fly so high that its pilot must wear a pressure suit for protection against explosive decompression. Yet it's built sturdily enough to skim the waves in turbulent air, out of sight of enemy radar.

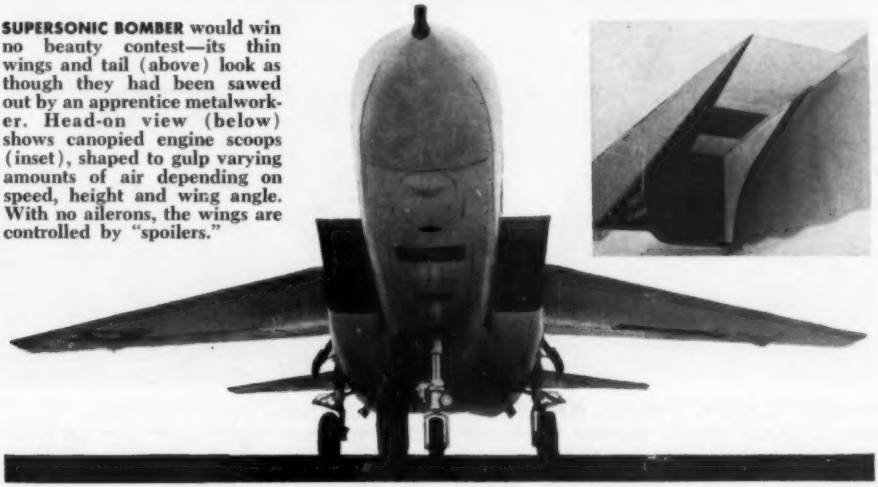


TAIL STINGER, a long tube serving as bomb bay, is tiny compared with coal-scuttle jet pipes at each side. Two GE J-79 engines produce 30,000 pounds of thrust. To insulate fuselage from jet heat, North American Aviation, manufacturer, gold-coats the titanium engine shrouds.

from Tail



SUPERSONIC BOMBER would win no beauty contest—its thin wings and tail (above) look as though they had been sawed out by an apprentice metalworker. Head-on view (below) shows canopied engine scoops (inset), shaped to gulp varying amounts of air depending on speed, height and wing angle. With no ailerons, the wings are controlled by "spoilers."



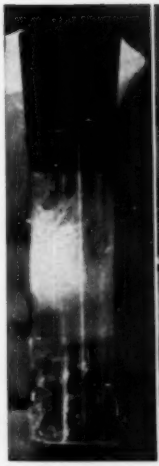
SMOKE SCREEN. Here's a bag designed to balk bandits. Strapped to the wrist of a bank messenger, if snatched it triggers a crimson smoke bomb that dyes money, securities and robber red. It's shown being demonstrated at Hoddesdon, England, before Scotland Yard detectives, bank and insurance officials.

PIGGYBACK TRAILER. Crews sent to guard planes crashed in remote areas now live in style. Before Navy maintenance men at Chase Field, Texas, built this "home away from home," they often camped night and day on the ground—vulnerable to snakes, insects, sun and rain—until on-scene investiga-

FIREFLY TAILS. A scant spoonful of crystals in the tube at right is worth $2,000. It's luciferin—the "cold light" of fireflies and a difficult chemical to obtain in quantity.

Johns Hopkins gets it from teams of children organized for firefly hunts in season, pays 30 cents per 100. Others are hired to remove tails from preserved bugs.

The crystals produce light for four years. John Hopkins uses luciferin in muscular-dystrophy and cancer research.

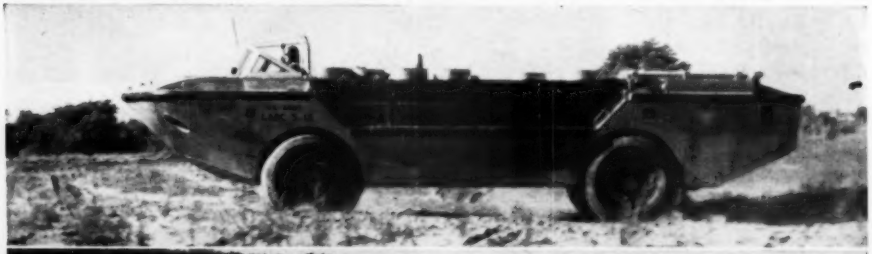


PENTADOME. The Army is experimenting with this five-domed air-supported structure as a missile storage and maintenance shelter.

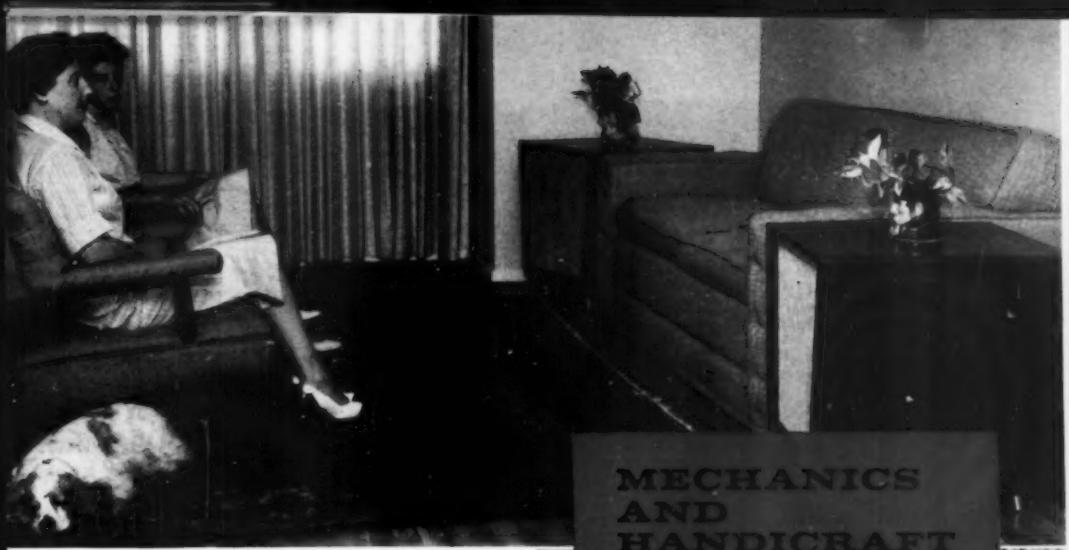
The big central hemisphere, 150 feet across and 85 feet high, will house the largest missile now built. Its four 100-foot appendages connect by revolving doors.

tions were finished. The cabin is made from scrap pipe and aluminum sheeting, is equipped with two comfortable bunks and a mounted two-gallon coffee container. It is well ventilated, screened against insects. When word of a crash is received, it is hoisted onto a pickup truck and is one of the first to arrive.

PLASTIC DRIVERS. You may be able to get in and out of your next car a little easier. To test seating comfort, Chrysler has built a six-foot "upper-limit" plastic man and a comparable lady companion. They show designers how to fit cushion contours and angles to the human frame and set windshields for best vision—for both short drives and trips up to 150 miles. Here's hoping.



FACE-LIFTED DUKW. The famous World War II amphibious vehicle now has a modern replacement. It's built of aluminum and called the LARC-5 (for lighter, amphibious, resupply, cargo, five tons). It will do everything the Army DUKW would do, but better—30 to 35 m.p.h. on highways, 10 m.p.h. in water.



Here's something pleasing and practical in hi-fi enclosures:

Stereo Speakers in Twin End Tables

By Scott J. Saunders

WHERE can you place two bulky speaker enclosures for stereo hi-fi? Here's one answer. Build the two as matching end tables. Even if you're not planning a stereo system, you may want the speakers. You'll be amazed at how much two speakers can improve monaural reproduction.

The bass-reflex cabinets are designed around matched 12″ three-way speakers. These are the popular, medium-priced kind that provide tweeter, woofer and midrange speaker in one compact coaxial unit.

Outward-flaring cabinet sides get rid of the objectionable square-box look of many speakers and give the cabinets a slim, graceful appearance. Tops and sides —the only main parts that show—are made of ¾″ walnut-veneered plywood. Other veneers, such as birch, maple or mahogany, can be used to match any furniture style.

The enclosures are identical. There-

CONTINUED

fore you can save work by cutting duplicate parts in one operation.

Concealing the edges. The bottom, back and speaker baffle are made of ¾" fir plywood. Since the baffle and front grille are recessed, it is necessary to face the exposed fir-plywood edges inside the sides and bottom with walnut veneer.

I did this by cutting a wide rabbet ¼" deep inside the lips and gluing in strips of walnut veneer ¼" thick. This is a little more work, but keeps the front-edge thickness to a pleasingly thin ¾". You can also cement veneer directly to the lips. In either case, the front edges should be faced with standard veneer strips to hide the plywood edges and match the cabinets' sides.

Sloping the sides. These flare outward at an angle of five degrees off vertical. To allow for this slope, cut rabbets in the lower edges of the sides at an 85-degree angle, instead of the usual 90. The sides of the bottom panel, sawed at a five-degree angle, will then fit perfectly into the rabbets, forming sturdy joints.

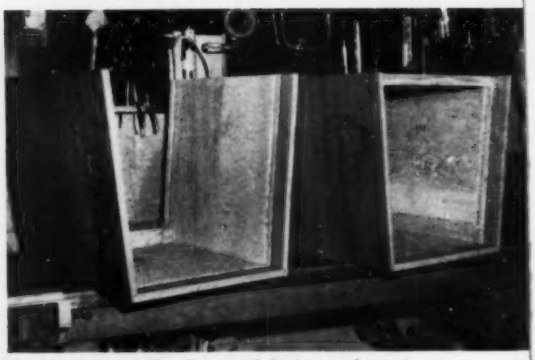
A snug fit all around is important to be sure you get vibrationless enclosures. To brace them further, stringers of ¾" plywood are glued into dadoes cut in the top, side and bottom panels at both the front and back.

Set the front stringers 2¼" back from the edges to support the recessed speaker baffle. Recess the rear stringers exactly ¾" so that when the back panel is mounted against them it will be flush with the rear edges.

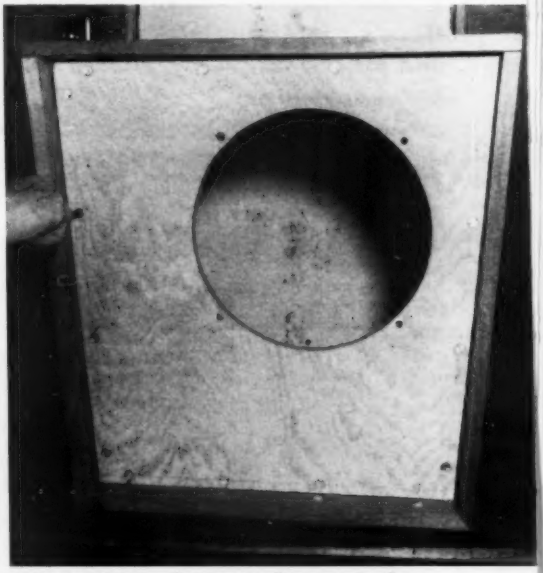
Begin assembly of the enclosure only after all cuts have been made. Before attaching the sides to the bottom, check to see that the angles are identical by setting a large triangle or square on the bottom with the vertical against the tapered side. The distance from the top of the triangle to each side should be the same. If it isn't, the enclosure will look cockeyed.

Firmly anchor the sides to the bottom with screws and glue. Then glue all front and rear stringers into the dadoes.

Check the walnut-veneer top to be sure it fits flush on all sides. Cover the exposed edges with matching veneer strips before it is put on. The top is then attached by spreading glue on the top edges of the sides and stringers. Pile heavy books on the top to hold it in place overnight, or until the glue sets thoroughly.



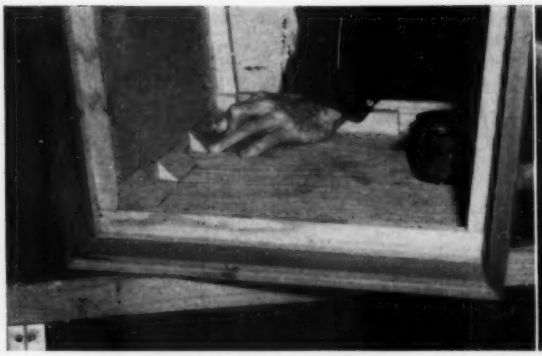
IDENTICAL TWINS: Outward-flaring sides give these matched speaker enclosures a modern, graceful look. Note how inner front lips are faced with walnut veneer (dark strips) set into rabbets to match veneered plywood outside.



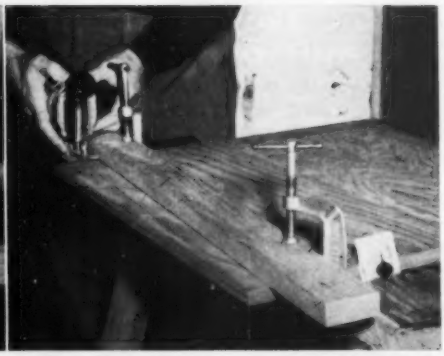
GLUE BLOCKS, much stronger than screws alone, are the secret of a solid, vibration-free cabinet. Use plenty along all joints. Remember that upper and lower blocks must be shaped to different angles to fit against sloping sides.

The speaker panel should be fitted into the recess and held in place by wood screws into the front stringers. Fasten the speaker to the panel with four ¼" bolts, lockwashers and nuts.

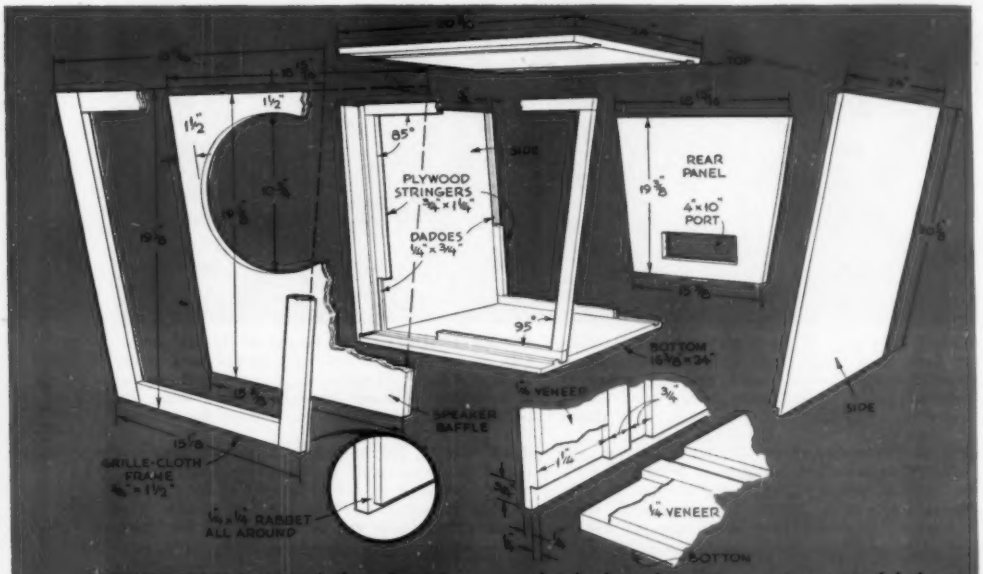
Tuning the port. A bass-reflex speaker enclosure requires a port to increase bass-



TAPERED PANELS for speaker and back can be cut easily by clamping a wood straightedge to the plywood at the proper angle and using it to guide a hand or electric saw. Cut the panels square first to simplify measuring, then trim.



SPEAKER BAFFLE must be permanently mounted with glue and screws against the front stringers to insure rigidity. As speakers are heavy and hard to hold, mark and drill their bolt holes before you install baffles in the enclosures.



OUTWARD FLARE OF SIDES is the only tricky construction to remember. Angle at top is 85 degrees, while one at bottom is 95. See detail sketch above for proper arrangement of dadoes and rabbets. Rabbet in bottom edge is double depth of one at sides to provide a lip.

frequency response. You'll find that opinions vary on whether the opening should be located in the front, bottom or back of the enclosure. While there are advantages in each location, the greatest advantages will be obtained by placing the port in the rear.

The size of the port is critical and is determined by the volume of the enclosure. In these matched enclosures, the volume for each is 5.3 cu. ft. By using the Popular Science Test Record No. 1, the best port size was found to be 40 sq. in. (Later it was discovered, too, that setting the enclosures about 8" away from the wall increased overall effectiveness.)

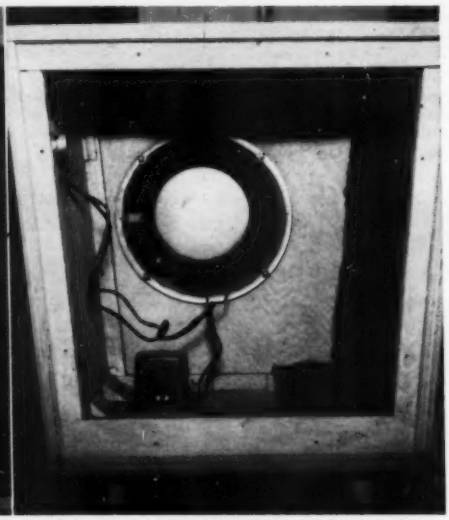
CONTINUED

As long as you buy 12″ speakers of similar design and don't change the cabinets' dimensions, you can use the size port shown here without bothering to tune your own. With different speakers, it's not difficult to establish correct port size by using the PS test record.

The grille-cloth frame was made 1/8″ shy on all sides to allow clearance for the Mellotone plastic cloth. A 1/4″ rabbet was cut into the back all around the frame so that the grille cloth could be stapled into a recess. The frame is held against the speaker panel with screws turned from the inside before the back is put on.

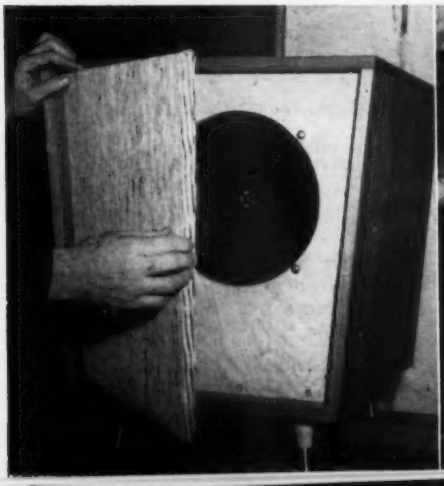
The back panel is screwed into the rear stringers. A honey-colored walnut finish was achieved by sanding with 8/0 garnet paper, filling the open grain with natural paste wood filler, and applying six individual hand-rubbed flat lacquer coats. This produced a beautiful professional finish that is well worth the effort.

STUBBY LEGS only 4″ long give cabinets a modern look, also make them appear less cumbersome than solid bases would. Two-way brackets here, available at hardware stores, give you a choice of mounting legs straight or at a slant.

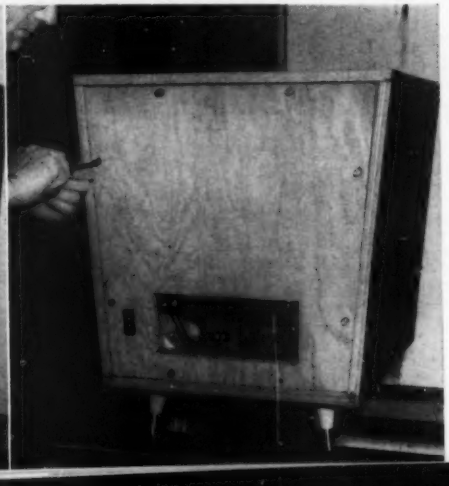


SOUND-ABSORBING MATERIAL is stapled under top, down one side and also across back panel so that it faces all opposing areas. Level control is mounted so knob can be reached from the outside, and crossover is screwed to the bottom.

SPECIAL OPEN-WEAVE GRILLE CLOTH (do not use ordinary material) is stapled to frame of 3/4″-by-1½″ plywood strips. Following today's general practice, speaker is mounted with tweeter vertical for best dispersion of highs.



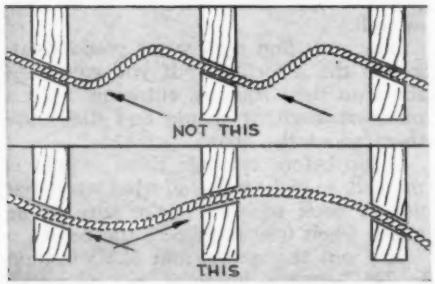
REAR PANELS, last to go on, are screwed but not glued so they can be removed for access. Bass-reflex port must be cut to exactly 4″ by 10″ and located as low as possible for best results. The speaker terminals are to the left of the port.



Short Cuts and Tips
FROM PS READERS

Ceiling-High Light Stand from Aluminum Tubing

THIS lightweight pole holds a clamp-on floodlight at any height between floor and ceiling. It's assembled from two three-foot lengths of ¾″ aluminum tubing, a 3′-long ½″ threaded rod, a pair of ½″ wing nuts and two rubber crutch tips. To use the stand, screw the wing nuts on the rod, wings together. Then slip a tube over each end. Hold the assembly upright and unscrew the wing nuts until the tubes are tight against floor and ceiling. Use a white crutch tip on the ceiling end of the pole, a black one on the lower end. The color difference will remind you not to swap ends and transfer floor dirt to the ceiling.—*Paul Corey, Sonoma, Cal.*

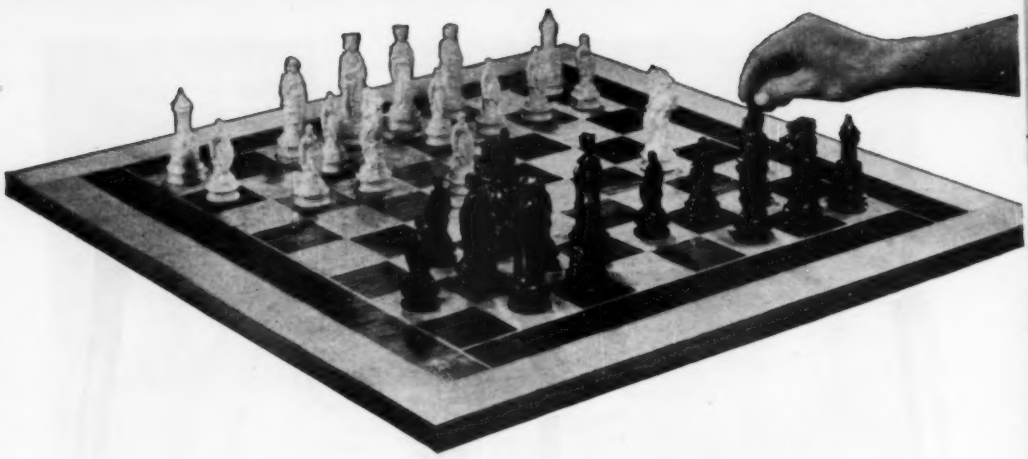


Boring for Electrical Cable

WHEN you must make angled holes for electric cable, drill adjacent joists or studs from their common side. This aligns the holes, reduces bends and friction and makes it easier to pull the cable through.—*G. E. Eckland, Drexel Hill, Pa.*

Keeping Papers Handy in Shop

OLD newspapers are invaluable for protecting workbench or floor during messy paint or paint-removal jobs. Keep them handy by folding them over a towel bar attached to the underside of the bench.—*George Henry, Madison, Wis.*



METALLIC DIVIDERS between rare-wood insets produce a real conversation piece. Add legs and the piece can double as a card table.

Using plastic aluminum in place of standard wood dividing strips adds up to—

Making an Inlaid Chessboard the Easy Way

THERE'S not an open joint in this inlaid chessboard. Yet extreme accuracy isn't needed for cutting and fitting the inlay squares.

Plastic-aluminum filler takes up any slight imperfections in the fit, and hardens into metallic strips that can be buffed bright. The result: rare-wood squares from all over the world, locked together with shiny aluminum.

A large assortment of rare wood is easy to get. Supply houses, such as Albert Constantine and Sons in New York, and Craftsman Wood Service in Chicago, sell inexpensive rare-wood sets to acquaint customers with the various types. These sample pieces are large enough to cut into the 2½″ squares needed for the chessboard. Thicknesses of the samples may vary. The squares shown were cut from ¼″ stock, but the popular 1/28″ inlay samples can be used as well.

You may find dark wood predominating in the assortment. If you come out short on light squares, cut some from a piece of birch or maple and distribute them about the board.

A tip before cutting: Each sample is marked, so make notes on what wood you use in each square. You're sure to be asked when friends admire the board.

Lay out the spaces and ⅛″ joints on a 29⅜″-square piece of ¾″ plywood. Carefully set the inlay squares and border strips on the plywood with contact cement. A ⅛″ wood strip temporarily placed between rows of squares helps to keep joints straight.

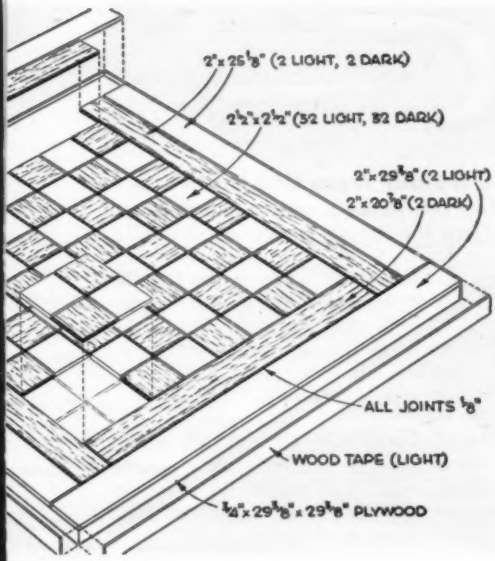
Press the plastic aluminum into the grooves, filling them a bit higher than the surface of the wood. When dry, sand the

LAY OUT THE ARRANGEMENT on ¾" plywood. Fine-wood samples are cut to fit precisely over the slightly separated squares.

entire surface flush and smooth. Cover the edges of the board with wood tape or thin strips of wood.

Several coats of clear resin sealer will show up the wood best. Rub each coat lightly with fine steel wool and polish the final coat with paste wax.

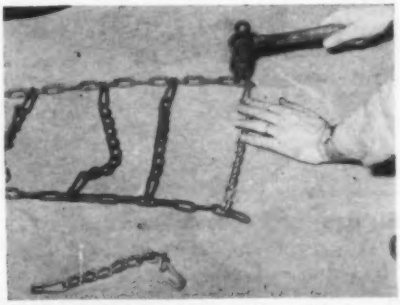
A set of legs screwed to the underside of the chessboard makes it a table for other games.—*R. J. DeCristoforo.*



How to Adapt Chains to Tires of New Size

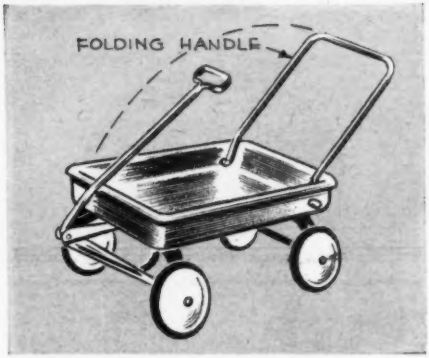
1 MEASURE THE CHAIN on the wheel it is intended to fit, as the first step in adapting old chains to tires of different size. You can do the job with standard chain-repair parts.

2 EXTEND THE LENGTH with standard repair links if necessary. To shorten, hacksaw through links, take out number required.



3 REPLACEMENT CROSS CHAIN will be needed if the chain is appreciably lengthened. These are available for all sizes of chain.

Short Cuts and Tips
FROM PS READERS



Pusher for Coaster Wagon

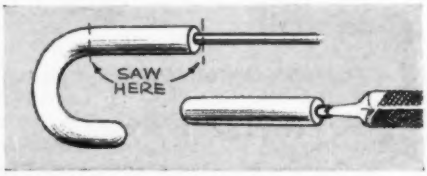
JUNIOR may do the steering, but an adult provides the power and keeps a coaster wagon under safe control with this folding handle. A steel rod, bent as shown, snaps into holes drilled through the wagon sides. When not in use, the pusher folds forward to rest inside the box. It won't interfere with normal use.—*G. E. Henderson, Oshkosh, Wis.*

Covering Wall-Lamp Wire

EVEN on the neatest pin-up wall lamp, the wire down the wall is no thing of beauty. You can hide it by pulling the wire taut and stapling it flat. Then cover with masking tape and paint the tape to match the wall. This is even more effective on papered walls where you can cover the wire with a strip of matching wallpaper.—*H. E. Cleary, NYC.*

Rubber Bed for Shaver

TO SAFEGUARD my shaver in the medicine cabinet, I keep it in a rubber soap dish. Now the shaver can't be accidentally knocked off the slippery shelf.—*Arthur R. Tanner Jr., Poughkeepsie, N.Y.*



File Holder from Old Umbrella

YOU can make a serviceable file handle from the handle of an old umbrella. Use a hacksaw to cut off the umbrella shank about 1/8" or 1/4" from the handle. Then saw the handle to the length you desire. Drive the tang of the file into the hollow steel shank stub; the metal ferrule grips the file firmly and won't slip. —*A. E. Bryant, Lynchburg, Va.*

▶▶▶DON'T throw away those candle stubs; save them to make snow shoveling easier. Rub one over a warmed snow-shovel blade; wet, sticky snow will slide right off.—*Keith George, Syracuse, N.Y.*

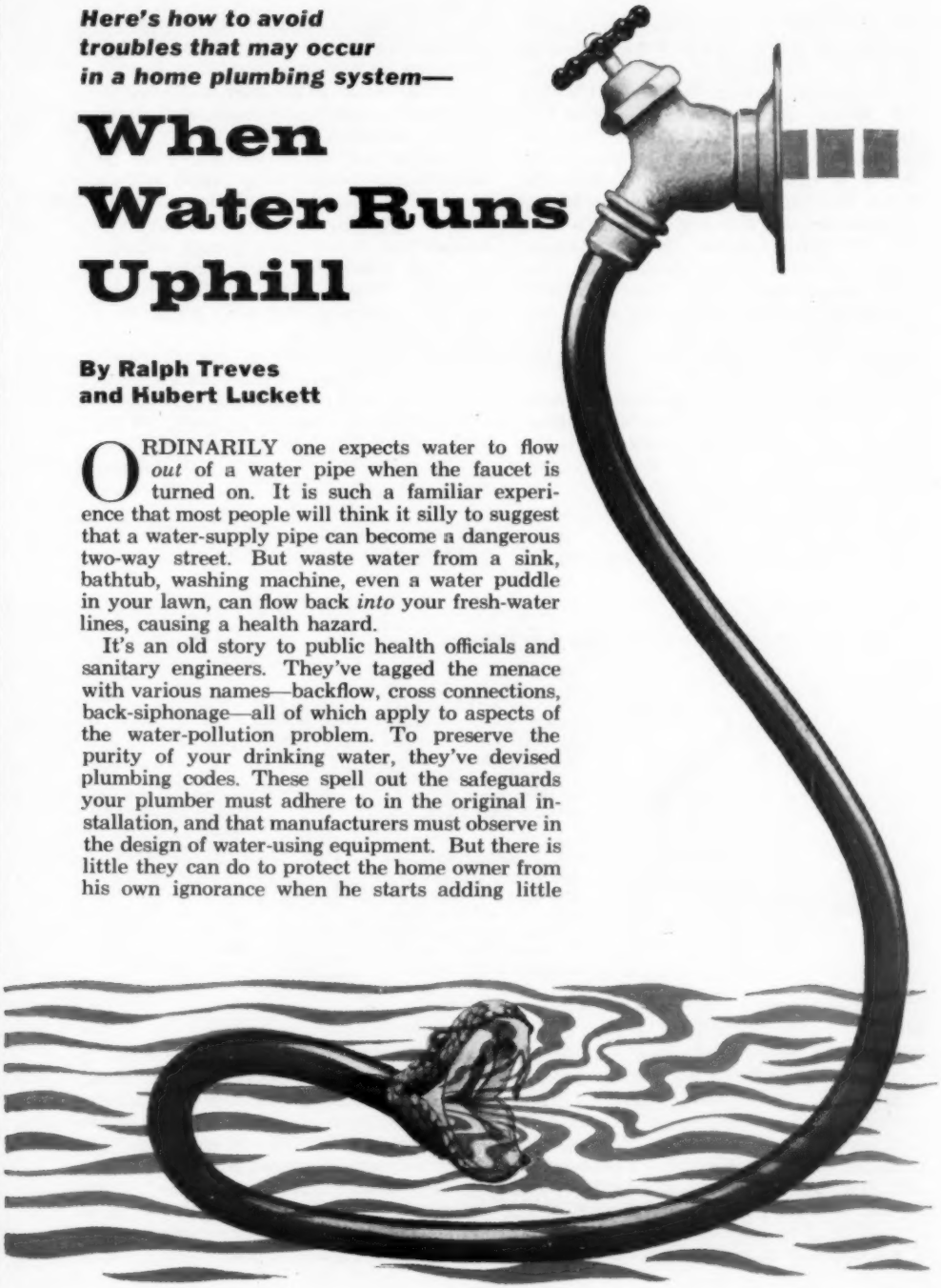
Here's how to avoid troubles that may occur in a home plumbing system—

When Water Runs Uphill

By Ralph Treves and Hubert Luckett

ORDINARILY one expects water to flow *out* of a water pipe when the faucet is turned on. It is such a familiar experience that most people will think it silly to suggest that a water-supply pipe can become a dangerous two-way street. But waste water from a sink, bathtub, washing machine, even a water puddle in your lawn, can flow back *into* your fresh-water lines, causing a health hazard.

It's an old story to public health officials and sanitary engineers. They've tagged the menace with various names—backflow, cross connections, back-siphonage—all of which apply to aspects of the water-pollution problem. To preserve the purity of your drinking water, they've devised plumbing codes. These spell out the safeguards your plumber must adhere to in the original installation, and that manufacturers must observe in the design of water-using equipment. But there is little they can do to protect the home owner from his own ignorance when he starts adding little



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conveniences to his basic water-supply system, or is tempted to bypass existing protective measures.

One expert, George Burke Jr., Chief of the Water Supply Section of the National Water Pollution Control Program, points out: "A great deal of work and expense is involved in making sure the water supplies of our cities are safe and wholesome. All this can be destroyed if the distribution system is not continuously protected from pollution . . . Waterborne diseases have been virtually eliminated in this country *but a few outbreaks still occur each year*. Most of these result from inadequate protection of the water in the distribution systems."

Every time you hook up a garden hose or slip a shampoo spray over the bathtub spigot, you may be tampering with the basic protection of your water system. That's the insidious part of the problem —the possible offenders are so commonplace.

There are many possibilities around the home for innocently setting up the conditions that can cause back-siphonage. But they all have one condition in common: The outlet of the pure water system can be submerged in contaminated water. In any situation in which it is possible for a solid column of water to exist between waste water and the supply system, you have a chance of pollution.

How it works. Anyone who has used a siphon hose to borrow gas from his car's gas tank knows the basic principles of backflow. What is not so readily apparent is how siphoning can take place in a water-supply system.

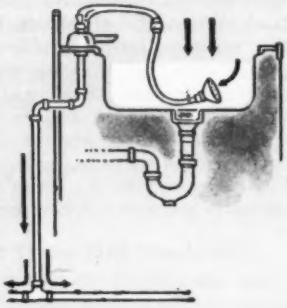
First, let's consider a special case—a common situation that occurs with that familiar chore of replacing a faucet washer at the kitchen sink. You shut off the water pressure at the main cut-off valve so you can work on the faucet. But water keeps dribbling from it. Now, to let air into the pipes so they can drain, you open the faucet in an upstairs bathtub.

When the sucking noises stop, you

How siphonage can cause backflow

HOME EXPERIMENT shows how a siphon can start automatically. Place a bucket above an outside tap. Fill it with a garden hose, then disconnect hose from tap.

THE SAME ACTION occurs if you submerge a sink spray in the dishwater. A drop in line pressure then has just the same effect as disconnecting the hose.

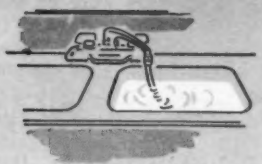


MOST people have used an ordinary siphon to transfer liquids from one container to another. And everybody knows that sometimes it takes a bit of doing to get the siphon started. You might suck on the siphon tube or you might fill the tube and cap both ends until the inlet can be submerged.

What you may not realize is that in a closed system of pipes such as your plumbing, a siphon can start all by itself. In the experiment at left, water will drain back through the hose when it is removed from the faucet as long as the other end of the hose is submerged. In the common household situation at right, even a momentary drop in line pressure can cause contaminated water to be siphoned into the pure water supply without your being aware of it.

Avoid these common household situations that invite back-siphonage

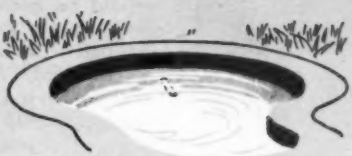
SHAMPOO HOSE SUBMERGED IN BATH WATER



SPRAY HOSE SUBMERGED IN DISHWATER

FILL HOSE SUBMERGED IN WASH WATER

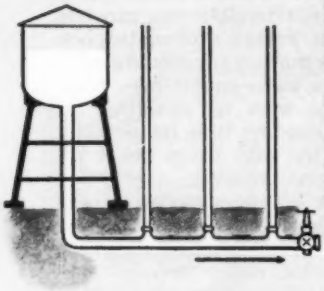
GARDEN HOSE LYING IN A PUDDLE WHEN WATERING



INLET PIPE TO FISH POND BELOW OVERFLOW RIM

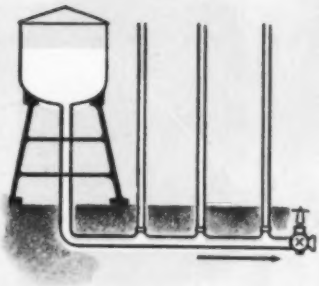
UNDERGROUND SPRINKLER SYSTEM UNLESS PROTECTED BY ANTISIPHON DEVICE

How water-supply pressure can drop

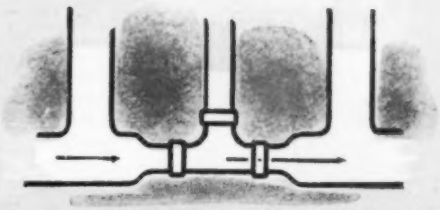


NORMAL PRESSURE will be maintained in the branches of a distribution system if demand doesn't exceed the capacity of the mains.

PRESSURE WILL DROP if a system must deliver more than it was designed for. Branches may even be subjected to negative pressure.



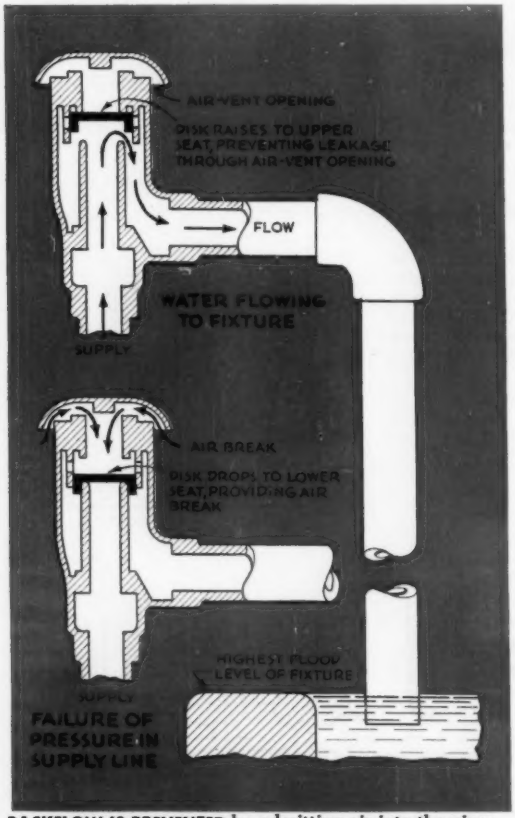
GOOD water-works practice calls for keeping a positive pressure in the mains at all times. But even in the best systems things can happen that will cause the pressure to drop either in your local street mains or in a branch line in your house. Pressure in a branch line varies with the velocity of flow in the trunk line supplying it. An open fire hydrant, a broken main, or simply a number of faucets turned on at once can increase the velocity in the trunk line enough to cause pressure to drop in a branch line.



PRESSURE DROPS when the velocity of the water flow increases. A restriction in the main line will cause the water to speed up if there is a demand farther along the main line.

CONTINUED

ANTISIPHON DEVICES, such as those shown here, are required by most plumbing codes for a piping arrangement where it is possible for a pure-water outlet to become submerged in contaminated water.



BACKFLOW IS PREVENTED by admitting air into the pipes if water pressure drops below atmospheric pressure. These devices are installed in the supply line at least 6″ above flood level of the fixture.

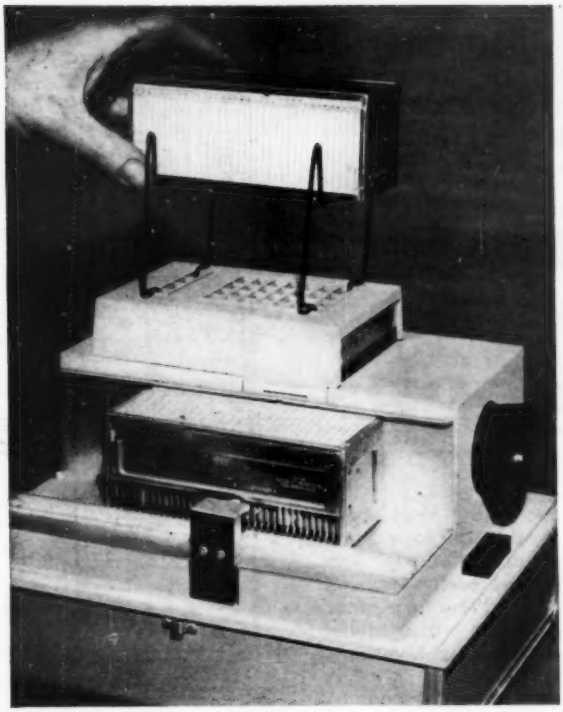
know all the water is out of the pipes. But suppose a shower hose were on the faucet and the open end were lying in a tub full of water. Now you have a perfectly good siphon. All the water in the tub would be drawn through the hose and into the pipes.

This is a special situation, of course. If it were the only way you could get backflow, there would be nothing to fret about. But exactly the same thing can happen without shutting off the water supply. Any time the water pressure in the line drops, there's the possibility of starting a siphon. The pressure drop may be only momentary and the backflow may amount only to a teacupful, but even that amount of contaminated water in the drinking-water supply can be risky.

Safeguarding your water. The surest, and often the simplest, way to prevent backflow is to provide an air gap between the outlet of the fresh water and the surface of the waste water. Where this is not feasible, you can buy vacuum breakers or antisiphon devices that are connected directly in the water-supply line. Most of these work by admitting air to the line any time the pressure inside the pipe drops below atmospheric pressure.

Most plumbing codes require an antisiphon device on all permanent water connections where the outlet might become submerged in contaminated water. This includes lawn-sprinkler systems connected by a hose, washing machines, and other appliances that don't have built-in backflow protection.

Remember, any hose connected to a faucet is as much a part of your water system as any of the pipes as far as backflow hazard is concerned. Even a closed faucet isn't sure protection. If water dribbles *out* when it's shut off, it will leak *in* if back-siphonage conditions should occur.



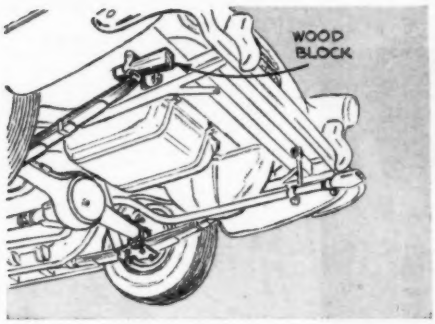
Short Cuts and Tips

FROM PS READERS

Slide Warmer Ends Projector "Popping"

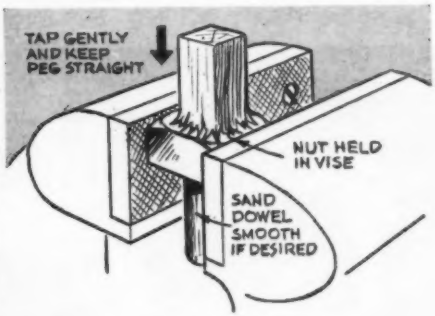
BECAUSE heat makes photographic slides expand, many projectors "pop" in or out of focus as each slide warms up. You can prevent this by prewarming the slides. A simple rack like this, bent from clothes-hanger wire, will hold a tray of slides over the warm air from the lamp house.—*Tom Griberg, Moline, Ill.*

▶▶▶TO KEEP the springs on lawn furniture from pinching and tearing the plastic pad covers, wrap the springs with plastic tape. The tape makes a slippery, elastic cover that wears well if smoothly applied.—*W. H. McClay, Pasadena, Cal.*



Un-Braking in Emergencies

WHILE driving through the desert, I broke the main leaf of a rear spring. This let the axle move backwards, tightening the parking-brake cable and locking the brakes. To release them, I raised the car with the bumper jack so I could force the axle forward. Then I held it in place by driving a wedge of wood into the spring shackle. The trick held while we drove 100 miles for permanent repairs.— *E. L. Enochs, Modesto, Cal.*



Making Dowels in a Hurry

IF YOU'RE caught needing dowels when the stores are closed, here's a quick trick for making your own. Slice square pegs of straight-grained scrap wood slightly oversize, then drive the pegs through a machine nut with a hole of the desired diameter. Round the starting ends of the pegs with a penknife so they'll enter the nut easily. You'll be amazed at the beautiful round dowels that come out.—*Ross Plaisted, Painesville, Ohio.*

Ever wish you could run a board through a machine and have it come out flat and smooth? Then here's the tool you need:

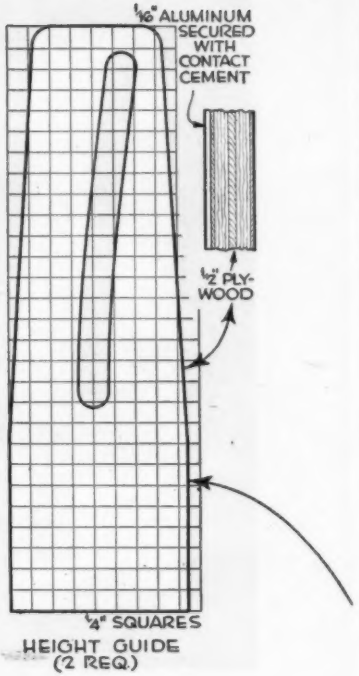
A Thickness Sander for Home Shops

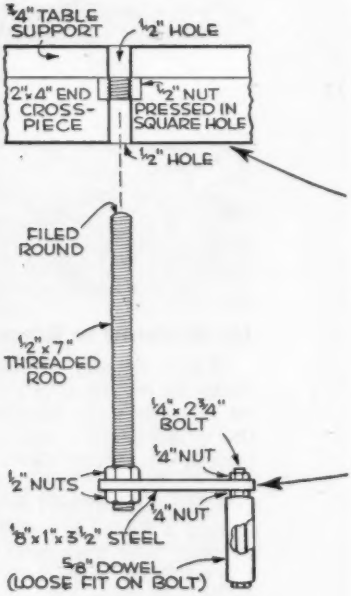
By R. J. De Cristoforo

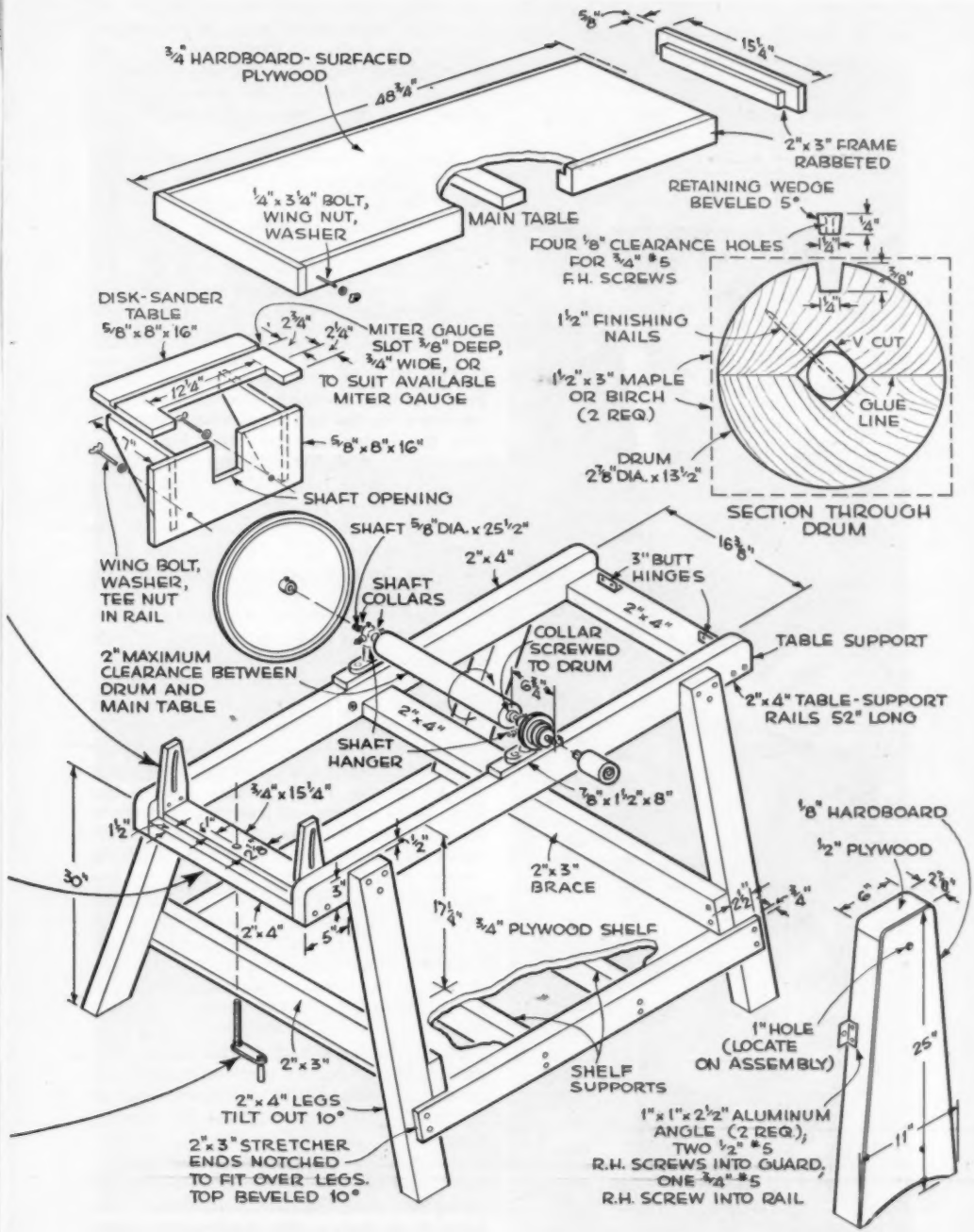
A THICKNESS sander is one of the most useful woodworking tools you could add to a home shop. Yet you aren't likely to buy one, for such tools are available only in large and costly versions, for commercial use. But you can build one for a small amount. Mine cost $23, and it includes a disk sander and a contour drum that set me up for just about any sanding job.

The tool's main job—thickness sanding—is done by a long, sandpaper-covered drum suspended on two

AS RUGGED AS IT LOOKS, the thickness sander can shave off 1/16" at a single pass. It'll smooth boards up to 2" thick.







3/4" HARDBOARD-SURFACED PLYWOOD
48 3/4"
5/8"
15 1/4"
2"x 3" FRAME RABBETED
1/4"x 3 1/4" BOLT, WING NUT, WASHER
MAIN TABLE
RETAINING WEDGE BEVELED 5°
1/4"
1 1/4"
FOUR 1/8" CLEARANCE HOLES FOR 3/4" #5 F.H. SCREWS
3/8"
1 1/4"
1 1/2" FINISHING NAILS
V CUT
1 1/2"x 3" MAPLE OR BIRCH (2 REQ.)
GLUE LINE
DRUM 2 7/8" DIA. x 13 1/2"
SECTION THROUGH DRUM
DISK-SANDER TABLE 5/8"x 8"x 16"
2 3/4"
2 1/4"
MITER GAUGE SLOT 3/8" DEEP, 3/4" WIDE, OR TO SUIT AVAILABLE MITER GAUGE
12 1/4"
7"
5/8"x 8"x 16"
SHAFT OPENING
WING BOLT, WASHER, TEE NUT IN RAIL
SHAFT 5/8" DIA. x 25 1/2"
2"x 4"
16 3/8"
3" BUTT HINGES
SHAFT COLLARS
2"x 4"
COLLAR SCREWED TO DRUM
TABLE SUPPORT
2" MAXIMUM CLEARANCE BETWEEN DRUM AND MAIN TABLE
6 3/4"
2"x 4" TABLE-SUPPORT RAILS 52" LONG
2"x 4"
SHAFT HANGER
3/4"x 15 1/4"
7/8"x 1 1/2"x 8"
1/8" HARDBOARD
1/2" PLYWOOD
1 1/2"
1"
2 7/8"
1/2"
30"
3"
2"x 3" BRACE
2 1/2"
3/4"
6"
2 7/8"
17 1/4"
3/4" PLYWOOD SHELF
2"x 4"
5"
1" HOLE (LOCATE ON ASSEMBLY)
25"
2"x 3"
SHELF SUPPORTS
2"x 4" LEGS TILT OUT 10°
1"x 1"x 2 1/2" ALUMINUM ANGLE (2 REQ.); TWO 1/2" #5 R.H. SCREWS INTO GUARD, ONE 3/4" #5 R.H. SCREW INTO RAIL
11"
2"x 3" STRETCHER ENDS NOTCHED TO FIT OVER LEGS. TOP BEVELED 10°

CONTINUED

A sanding center for all types of smoothing jobs

NAME your requirement: This universal tool surface-sands boards and reduces their thickness (just below), smooths edges (center) and inside curves or irregular shapes (bottom).

SURFACE SANDER

DISK SANDER

CONTOUR SANDER

shaft bearings. Boards of any length and up to 12″ wide, passed over an adjustable table beneath the rotating drum, come out smooth and uniform in thickness. Warped boards can be dressed flat and parallel on both sides by repeated passes beneath the drum.

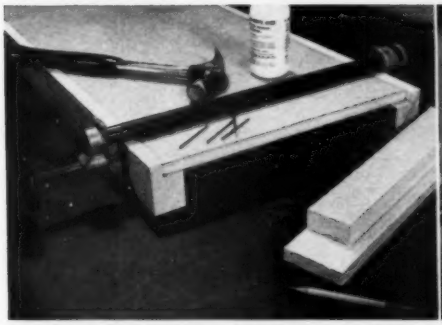
Make the table first. The entire machine is built around the main sanding table. So begin by assembling this. Hardboard-surfaced plywood was used, but you can get an equally smooth table by laminating 1/4″ hardboard over 3/4″ plywood. Frame the plywood with rabbeted two-by-threes. Add a single cross member beneath the plywood at the centerline to stiffen it at the sanding area.

The table support is a solid structure resembling a sawbuck. Use straight two-by-fours for the rails and cross members. Cut the latter exactly 16 3/8″ long for a snug fit at the adjustable end of the table. Cut the legs to 30 1/2″ length and form a 10-degree bevel about 3″ wide on the inside face at the top of each. Bevel the bottom ends to fit flat against the floor. Nail the legs to the table support, then drill holes for 1/4″ carriage bolts. Install the two-by-three stretchers, shelf supports and shelf, then add a cross brace at each end above the shelf.

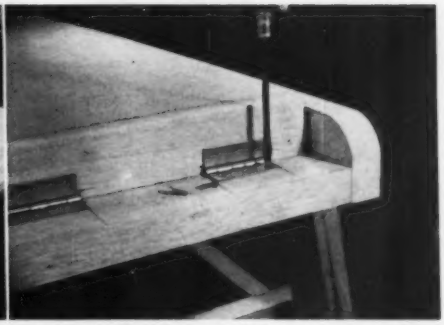
Trace the height-guide pattern on 1/16″ aluminum and on 1/2″ plywood, cut them out, and contact-cement the aluminum to the outside face of the plywood. Screw the guides to the ends of a 3/4″ base block cut to exactly 15 1/4″ length. Clamp the base block on top of the end crosspiece and drill a 1/2″ hole through both. Remove the base block, chisel a tight-fitting square recess around the hole in the crosspiece and press a 1/2″ nut into it. Bed the nut with wood putty, if necessary, to seat it firmly. Permanently install the height-guide base over the nut. Assemble the crank handle on a 7″ length of 1/2″ threaded rod and screw it in position.

Pivot the back end of the main table on two 3″ butt hinges screwed to the back crosspiece. Check the adjustable end of the table for free up-and-down movement, then locate the hole for the 1/4″ height-locking bolts. Drill through the height-guide slot on each side (accurately) to make the hole for the bolt. Insert the bolts from inside the frame and again check the up-and-down movement. If

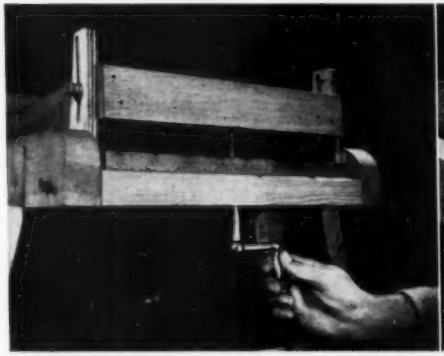
Last steps: mounting the table and truing the drum



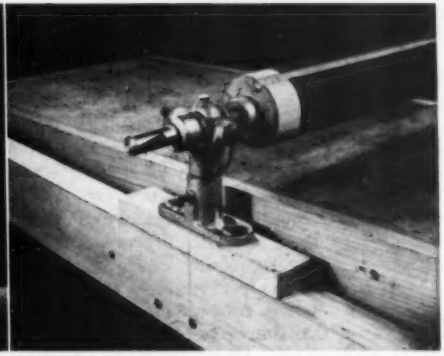
HARDBOARD-SURFACED PLYWOOD makes a smooth top for the sanding table. Frame the plywood with two-by-threes rabbeted to receive it. Assemble with glue and either screws or nails.



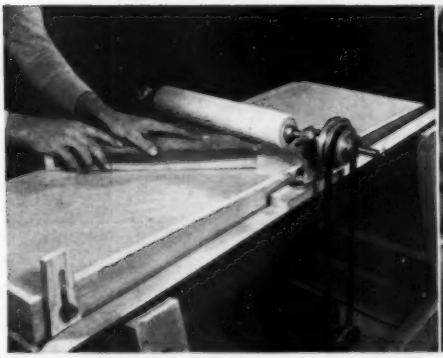
THE TABLE PIVOTS up and down on two 3" butt hinges (be sure to pick a pair with tight pins and no play). Chisel shallow grooves in the crosspiece so the hinges will lie flat.



ELEVATING CRANK, turning in a nut bedded in the wood, raises the adjustable end of the table. Wing nuts or knurled screws (shown) lock the table after its height has been adjusted.



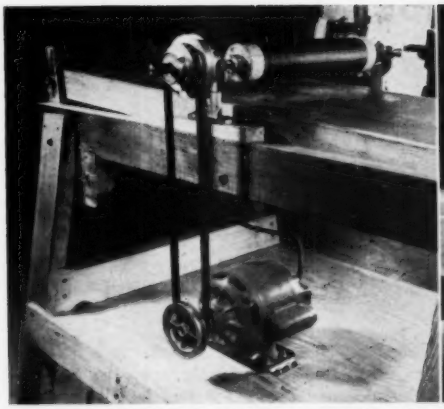
SHAFT HANGERS are used to support the drum shaft. Other bearings can be used, but make the shim blocks high enough to maintain maximum 2" clearance between drum and table.



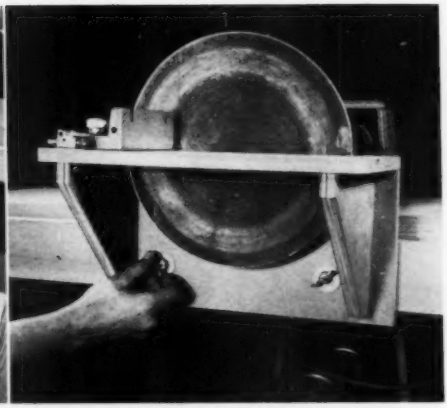
TRUE THE DRUM by sliding a sandpaper-covered block beneath it. Don't reduce its diameter to less than 2⅞", or sandpaper sheets will overlap too much when wrapped around it.

HARDWOOD WEDGE holds the sandpaper in place. Insert one edge in the groove, wrap the sandpaper tightly around the drum and tuck the other edge in. Then screw down the wedge.

CONTINUED



MOUNT THE MOTOR ON A HINGE screwed to the shelf. Its weight will maintain belt tension. You might locate the on-off switch on the left side rail instead of as shown, where it would also be convenient to the much-used disk sander.



SANDING TABLE is fastened to the rail with two wing bolts; the disk is the type with a 5/8" hub that locks on the shaft with a setscrew. Cut a groove in the disk-sander table to fit the miter gauge from your table saw.

there's binding anywhere in the slot, file additional clearance for the bolt.

Best way to turn the drum: For the drum, select two straight-grained pieces of maple or birch 1½" by 3" by 13½". Along the center of each block cut a V groove deep enough so that when the pieces are joined the two V-grooves will form a tight-fitting square hole for the 5/8" shaft. Try a few grooves in scrap until you get the proper blade setting. Drill three transverse holes through the shaft and drive 1½" finishing nails through the holes to pin the shaft to one half of the drum block. Glue on the other half block. When the glue dries, you'll have a 3"-square block firmly mounted and centered on the shaft. Screw a 5/8" shaft collar to each end of the block.

Chuck one end of the shaft in the lathe headstock and support the other end with a tailstock live center. Check the diameter often as you turn the drum and stop when you get within 1/64" of the finished 2⅞" diameter. This final fraction can be removed by truing the drum with sandpaper after it is mounted in position

[*Continued on page 242*]

WHAT'S YOUR MECHANICAL IQ?

The Case of the Bicycle-Chain Hoist

"WILL you sell me three of these used pedal sprockets?" Bill asked the bike-shop repairman. "Figure I can use them and some old chain to rig a hoist for lifting the engine out of my sports car."

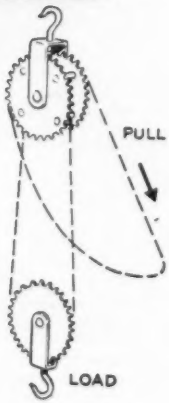
"Sure, just pick them out," said the dealer. "But you'll need hefty bearings and strong hooks to take the load."

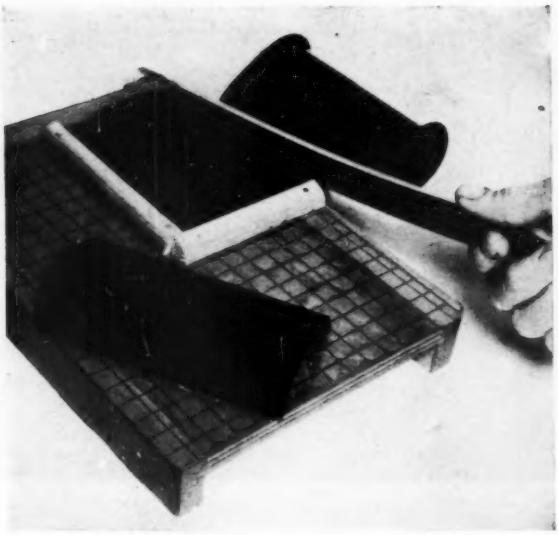
Bill found three sprockets of identical size and took out his wallet. But the dealer shook his head.

"You'll never build a hoist with those," he predicted.

"Why not? I'll bolt two together and run the chain like this over them and the third one at the bottom."

Quickly he sketched the arrangement shown. Would it work? For the answer, turn to page 189.





Short Cuts and Tips

FROM PS READERS

Cutting Roll Film Quickly in the Dark

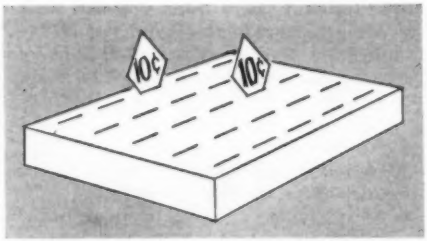
CUTTING your own sheet film from big spools of government-surplus roll film saves a lot of money, but can be slow going in the dark. Strips of molding tacked to a cutter form a guide that lets you quickly lop off each piece exactly the right size. I get 50 uniform four-by-five sheets from one 200″ roll, saving about $5.—*John A. Comstock, Wellsboro, Pa.*

Reverse Labels are Stainproof

BOTTLE labels that resist the stains of day-to-day handling can be made by lettering the inscription in reverse on the gummed side of cellulose tape. Attached to the bottle, the copy will be correctly visible and permanently protected.—*G. E. Hunt, Chicago.*

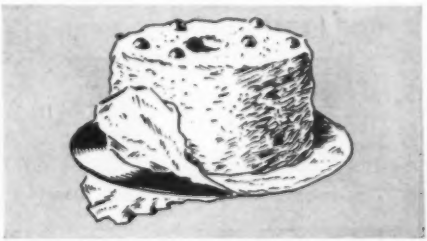
Clipping Gloves to Belt

A U-SHAPED metal strip fastened to the eyelet of a spring-type paper clip provides a convenient way to carry work gloves. Hooked over the belt, the clip frees the worker from having to carry gloves in hands or pockets.—*Ralph Baker, Blue Diamond, Nev.*



Drying Rack for Price Tickets

A SERIES of slits cut in the cover of a pasteboard box convert it to a drying rack for freshly lettered price tickets. The cards, inserted in the slits, will be held safely erect until they're dry.—*John Argyle, Milwaukee.*



"Platters" Make Real Plates

DISCARDED phonograph records, covered with aluminum foil, are good "disposable" plates for carrying cakes to a sale or a church supper. There's no need to worry about their getting lost or broken.—*Mrs. Edwin Johnson, Iron River, Mich.*

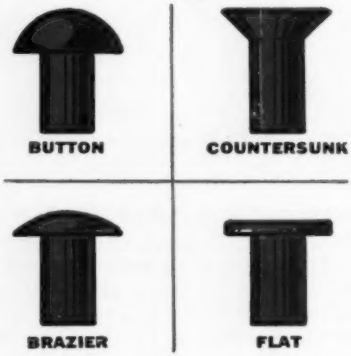
Facts it'll pay you to know about—

The Handy Art

FOUR thousand years ago, bronze-workers came up with a very practical fastener. It was a heavy pin with a head on one end. You pushed the shank through mating holes in any two parts you wanted to join. Then you flipped the assembly over and bashed down the tail. That formed a second head. Between the two, the parts were snugged together so tight even water couldn't find a path between them. It was a handy way to put a seam in a pot or pan, or stitch up the plates of a javelin-proof vest.

Today these same fasteners—rivets—are used in industry by the tens of billions each year. You'll find them just as useful for home projects and repairs. That goes for everything from assembling a sturdy shop-tool base or boat trailer to applying new handles to garden tools. It's a must for many leather and ornamental-metalworking jobs. It's the trim way to pin hi-fi kit components to a chassis. In modelmaking, miniature rivets can be as functional as they are realistic in appearance.

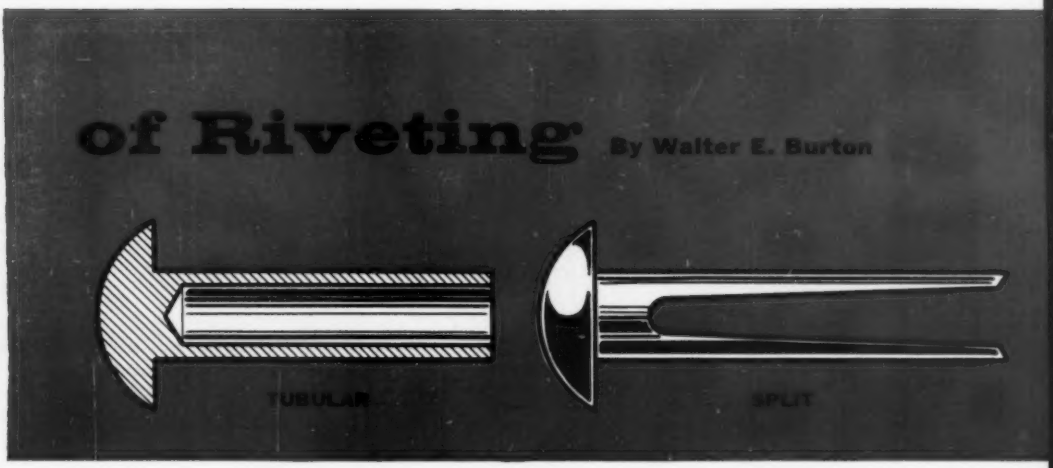
Rivet-head types you'll find most useful

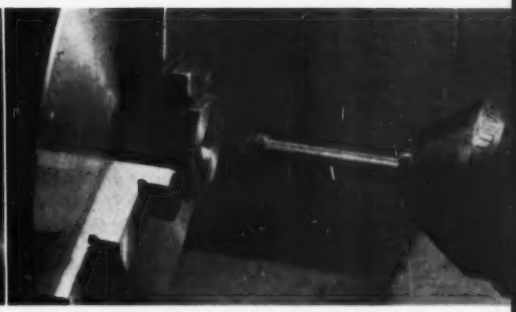


Choosing the right rivets. As easy as riveting is, there are facts and knacks you should know to get professional results. You're halfway there when you can walk into a big hardware store and not be bewildered by the many combinations of rivets offered: shanks and heads, sizes and metals. To pick the kind best suited to your needs, remember these points:

- All rivets fall into three basic groups: solid, tubular and split. In each case, the name describes the kind of shank.
- Solid rivets make the beefiest joints. Use them for all heavy metal-to-metal bonds, authentic reproductions of antique metalcraft, and working-model assemblies that will be under pressure or strain.
- Tubular rivets are less strong, but easier to apply. A hand-down from horse-and-buggy days, they're designed to cut their own holes in leather, fiber and thin sheet metal. They're good, too, for join-

# of Riveting By Walter E. Burton





BOLSTERS, or "bucking blocks," are slabs of steel that back up rivets for peening. Hemispherical or cone-shaped cavities in their upper faces protect rivet heads while the shanks are being shaped. Homemade workshop versions are easy to form from scrap stock. After starting the hole with a drill, smooth it out with the right type of rotary file, as shown above.

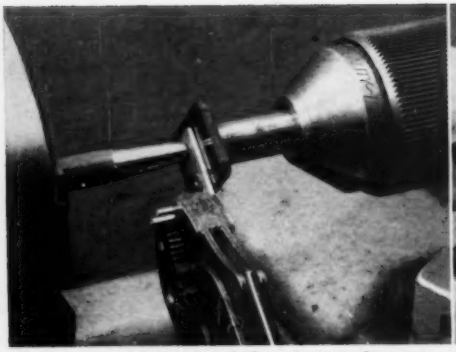
Three steps for a strong sheet-metal bond

TIGHT-FITTING WASHER, or "burr," is forced over rivet shank with a combination rivet set and cup tool. A hole in the set slips over the shank end.

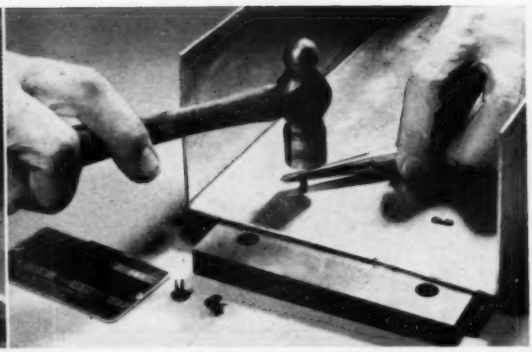
WITH BURR BUTTING WORK firmly, rivet's shank end is rounded roughly to shape, while the flat head rests firmly on an anvil top below it.

CUP-SHAPED CAVITY in the set is placed over the roughly peened other rivet head. Sharp blows on the set then give head a neat hemispherical form.

CONTINUED



SETUP FOR SPINNING tubular rivet ends in a lathe is shown above. A rod in the tailstock chuck backs up work and advances it against centerpunch turning at moderate-to-rapid speed.



PRONGS OF SPLIT RIVETS are spread behind sheet-metal parts by placing a punch between the prongs and tapping its side with a hammer. A couple of direct hammer blows finish the job.

ing soft materials to ones that are hard.

• Semitubular rivets are variations of the tubular type, in which only the end of the shank is hollowed out, for easy clinching. When buying these, you should know the combined thickness of the materials to be joined, and choose rivets whose solid shank sections extend not quite through the whole assembly. Like the solid rivet, the semitubular offers strong resistance to shearing action, but its flanged end isn't as husky. Don't use tubulars or semitubulars where parts will be under heavy tension.

• Split rivets have a divided shank that spreads out when they're driven, tack-fashion, into most materials. This self-anchoring feature makes them handy for attaching brake and clutch linings, fastening sheet materials to wood, and assembling and repairing fiber and leather products. They can also be installed through drilled holes, then cleated on the far side of the joint.

SPECIAL RIVET-TYPE FASTENERS are often handy for small crafts work and repairs. The two-piece kind shown here snap together and are then clinched by squeezing or hammering.

Which head style for what? There's more variety in rivet heads than in shank types. But unless you're reproducing some structural-steel design in a model, you can forget all but three. These are the button head, flat head and flat-top countersunk head.

The button head, which is hemispherical in form, is the strongest. When combined with a solid shank, it's the best for joining heavy angle iron and bar stock. Because it's decorative, it's also applied to many tubular and semitubular rivets. A variation of the button head is the brazier head, which is more elliptical in form.

Flat heads are commonly offered in all three shank styles. While not as hefty as button heads, they usually provide a broader bearing area. That's important when you're dealing with soft materials and sheet metal, to prevent tear-outs.

Flat-top countersunk heads produce strong, smooth-surfaced joints. When applying them, you must ream mating cavities in the parts being bonded. This limits their use to comparatively thick stock.

What material is best? Wherever possible, use rivets of the same metal as the parts to be joined. This is especially important on outdoor assemblies, or where

SIMPLE WAYS TO SET SMALL RIVETS: Solid aluminum midgets are soft enough to be compacted with the pressure of a vise. To avoid impressions of jaw corrugations, a block of soft metal can be placed behind the head, and a sheet of smooth steel applied to the shank end. Another method: A cold chisel ground to a rounded edge forms a clinching cross.

bonds will be exposed to moisture. There, electrolytic action between unlike metals will break down the best joint rapidly. With a choice of mild steel, wrought iron, tinned iron, brass, copper and aluminum rivets, you should have little trouble matching common sheet, tubular and bar stock.

How to apply solid rivets. Because it expands throughout its length during clinching, a solid-rivet shank can supplement the gripping action of the heads by preventing side play. To make sure it does, drill rivet holes for a fairly snug fit. Use a rivet that projects from one to 1½ times its own thickness beyond the joint. Tap it into place. Then, with its head resting on an anvil or other fairly massive chunk of metal, clinch the tail by pounding on it with a ball-peen or cross-peen hammer. Start with several square blows, using the flat face of the hammer. This will spread the shank, completely filling the holes. Finally, with the ball or cross peen, shape the opposite head with light hammer blows directed at radiating angles toward the shank center—not straight downward. Flat hammering will splay the rivet and produce a weak, pancake head.

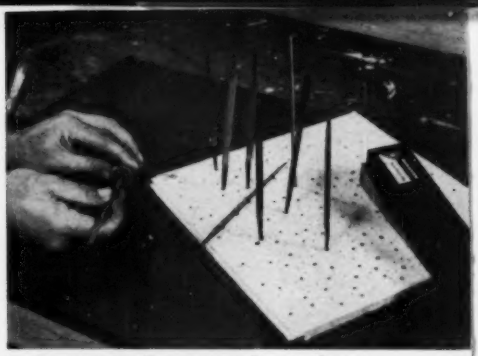
When a clinched end is to be flush with the work, ream out the rivet hole with a countersink bit (preferably 90 de-

[*Continued on page 254*]

Homemade rivets solve special problems

ESCUTCHEON PINS are ideal for many model projects. You can trim them to uniform shank length with a jig like the one above. At right, a block of steel with a countersunk hole forms flush-type rivets. Heads are roughed out with a hammer (above). For final shaping, the rivet body is extended into an anvil hole and the head hammered into the countersink.

7 Off-Ceiling Uses for Acoustical Tile

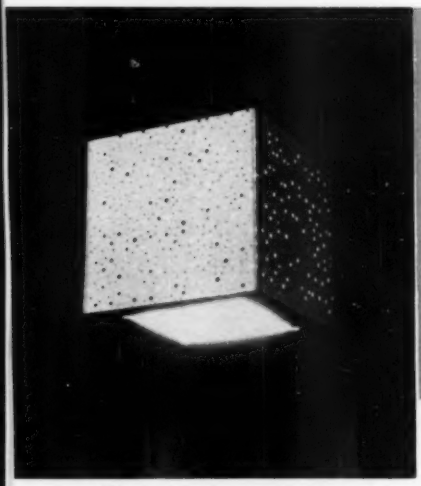


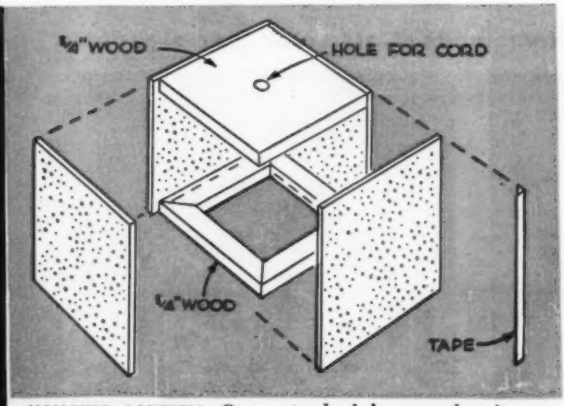
TOOL GUARD. To protect fine tools out of storage and to keep them handy while you're working, have a square or two around for shop use, as shown above.

PICTURE FRAME. Four narrow strips of the fissured-surface type do nicely for framing since they are already tongue-and-grooved. Mount picture on ⅛" hardboard, slip latter into grooves after gluing. Use hangers on the hardboard surface.

MAT. Use it to mount a photo or piece of artwork. You can attach the picture to the tile with pins, map tacks or rubber cement.

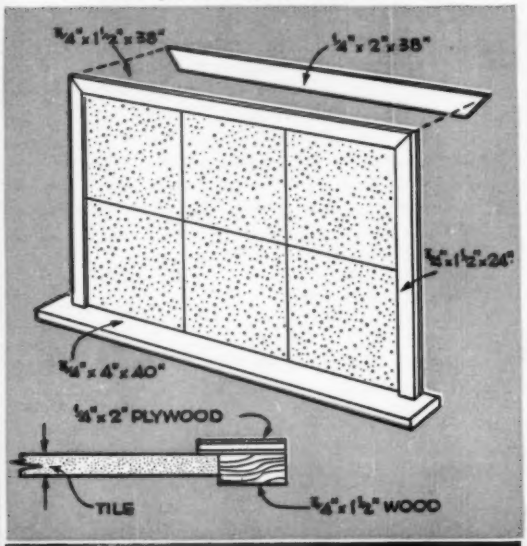
CORNER BRIGHTENER. Turn the corner and follow down the wall with ceiling tiles to brighten a dark corner such as this. Acoustical gum and a few small finishing nails hold tiles.

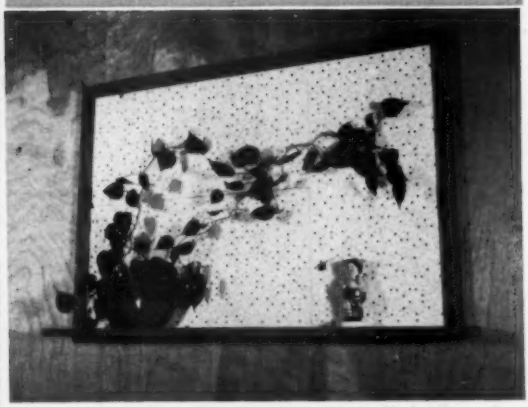




HANGING LANTERN. On a standard lamp socket it casts plenty of light below and a pleasant pattern through its sides. Peel off layers from back side of tile until holes go through. A cube ranging from 8" to 10" makes a good-size lantern.

BULLETIN BOARD or photo gallery—take your choice. Frame eight squares with wood like this. Rear surface of tile, smooth and tan-colored, looks more like bulletin board.





PICTURE PLANTER. Random-drilled tile, when framed like this, provides a striking background for a vine. Press short dowels or golf tees into the holes to support the trailing vines.

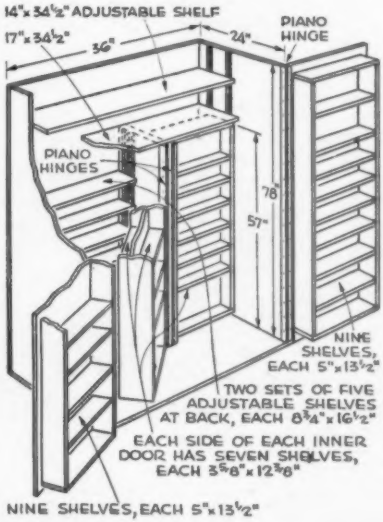
Here's a Home Supermarket on Hinges

MORE than 70 feet of shelving—every inch of it usable—are hidden by the doors of this kitchen cabinet, occupying only a two-by-three-foot floor space.

Shelf-lined doors do the trick. Opening them reveals enough one-item-deep shelves to cover a 10-foot wall from floor to ceiling.

Almost everything you bring home from the supermarket fits the narrow shelves, with nothing hidden from view. The stuff that needs deeper shelves will fit above the inner door unit. Shelf edges are fenced with plywood to hold stored canned goods.

The cabinet is offered in 38 hardware and finish combinations by Quaker Maid Kitchens, Inc., of Temple, Pa. The firm includes it in their kitchen designs in both built-in and free-standing models.

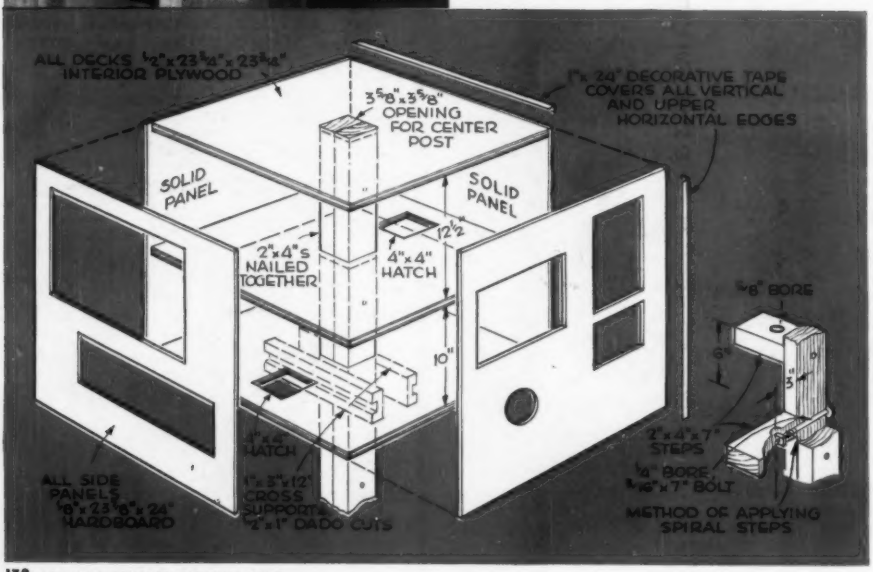


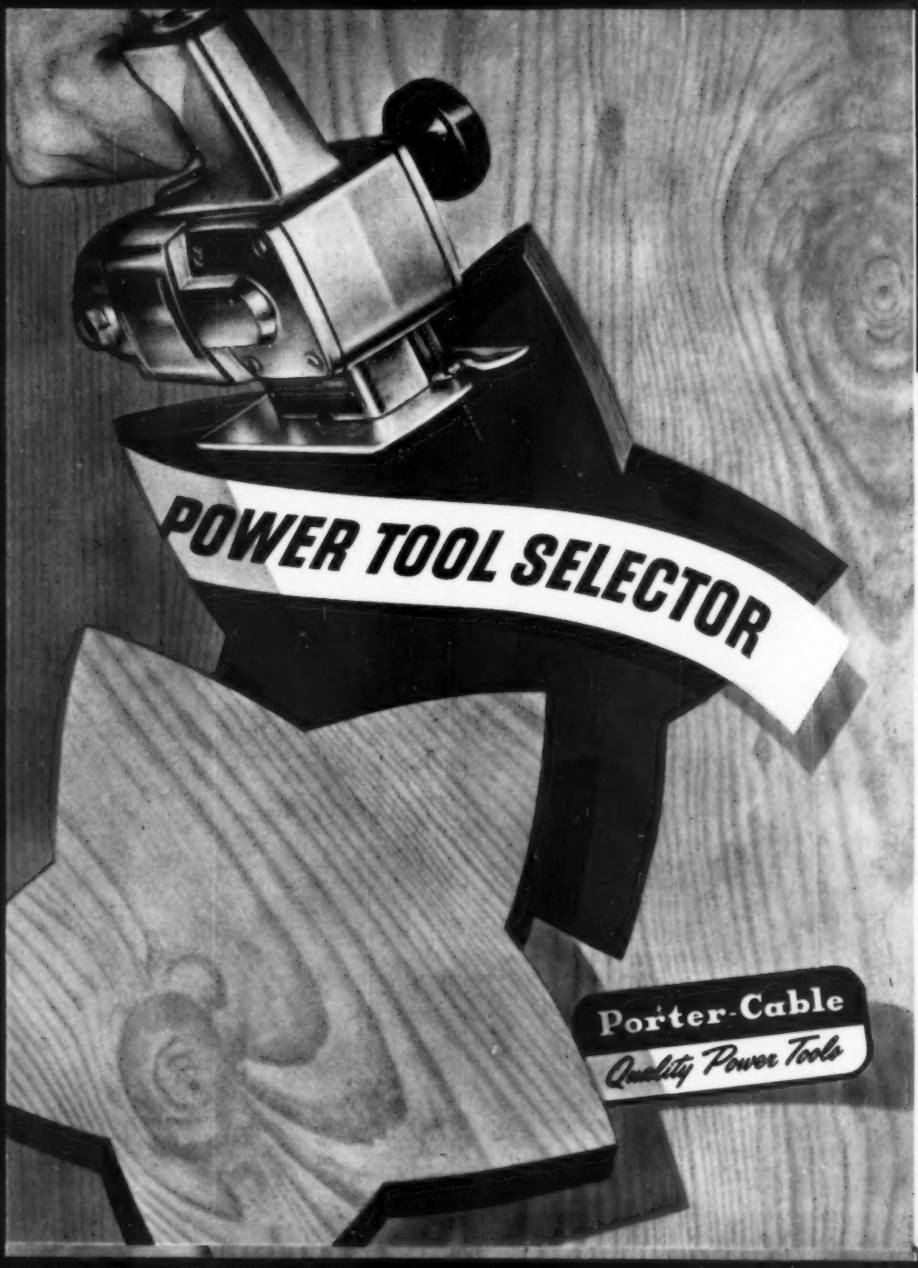
Penthouse for City Cats

CATS are incorrigible climbers and the trait can play havoc in a city apartment. Tired of replacing frayed drapes and vases toppled off the mantelpiece, we built this double-decked penthouse for our two Siamese pets.

It's perched at the top of a post that reaches from floor to ceiling of the living room. The "spiral staircase" approach is a series of projecting blocks, each painted a different color. Small hatches provide access to the decks above, with dadoed grooves in the supports below the lower one offering an entry assist.

Six lookout holes of various sizes, jigsawed in the side walls, give our feline friends unsurpassed views of the situation below. They're now as contented as any of their country cousins. —*Robert Gannon.*




POWER TOOL SELECTOR
Porter-Cable
Quality Power Tools

All Purpose BELT SANDER

The endless belt moves with a continuous straight line action over two pulleys, providing far faster finishing results than ever before. These sanders are light weight and portable—yet powerful enough to tackle any sanding job . . . with really "professional" results. Porter-Cable Belt Sanders are used for heavy stock removal, fine cabinet finishing, paint and varnish removal, boat work, rubbing, polishing, sharpening, grinding, etc.

4-STAR Belt Sander
Model 165

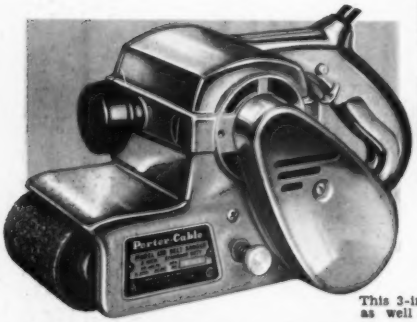
- Sands, Rubs and Polishes Wood, Metal, Plastics
- Powerful Motor
- Specially Lubricated Bearings
- Big 2½" x 21" Belt Size

ONLY **$49.95**

ACCESSORY BENCH STAND

Converts Belt Sander to Stationary Sander-Grinder. Ideal for sanding and grinding small pieces, sharpening knives, tools, etc.

Model 5047: $9.95



5-STAR Belt Sander
Model 136

- Positive Belt Tracking
- Balanced, Compact Design
- Ball and Needle Bearings
- Easy Belt Changes
- Constant-Duty Motor

$69.95

This 3-inch Belt Sander is ideal for sanding large surfaces as well as all the other jobs a belt sander does best.

Ideal for sanding broad surfaces. With correct abrasive, sander quickly fits doors, storms, screens.

Quickly removes paint or varnish. With felt and canvas belts, it does a professional job of polishing and rubbing.

With Bench Stand, sands curved edges, small pieces. Also sharpens knives, chisels, tools, garden implements.

Orbital FINISHING SANDER

Smooth orbital action sands with, across and against grain—without marring. Produces slick, factory finishes . . . for every sanding operation, from raw wood finishing to fine grain sanding. Light weight and so perfectly balanced even a housewife can handle easily and skillfully. Ideal for furniture, boats, wallboard joints, doors, windows, and screens. Positive locking clamps enables you to quick-change sandpaper sheets in seconds; powerful universal motor (not a "vibrator"!); ball bearing construction for long life.

3-STAR Finishing Sander
Model 145

- Motor driven—not a "vibrator"
- Exclusive Gear Transmission
- Simple abrasive changes

Low-priced orbital motion sander made especially for home craftsmen and hobbyists. **$29.95**

5-STAR Finishing Sander

- Sands Flat, Curved, Irregular Surfaces
- Ball Bearings Throughout
- Heavy-Duty Industrial Motor
- Perfectly Balanced
- Pad Cannot Mar Upright Surfaces

Model 106A
$49.95

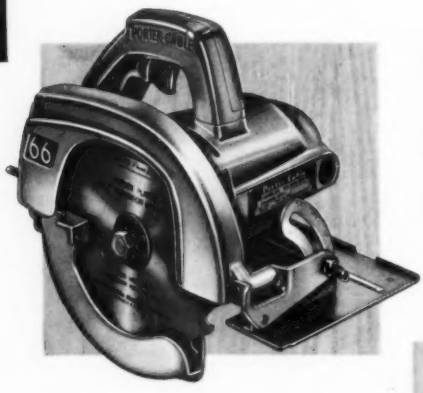
CABINET WORK—Finish built-in cabinets and furniture, blend butt joints. Orbital motion is ideal for this work.

LEVEL PLASTER — Feather-edge taped joints, level plaster patches, smooth walls and ceilings with this handy tool.

PAINT REMOVAL — Rough sand, blend sanded areas, smooth knots, sand undercoats with this Porter-Cable Sander.

Circular SAWS

The portable power saw is the workhorse in any workshop. Porter-Cable Saws are the world's finest . . . built with professional quality features for top performance . . . light weight with plenty of power, speed, and dependability. You can make every possible cut, including 45° angles. Converts to stationary saw with accessory saw table. A variety of blades is available to perform a multitude of cutting tasks.

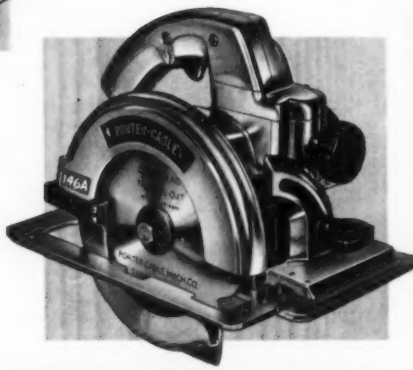


3-STAR 6½" Circular Saw
Model 66

- Safety Kick-proof Clutch
- "No-Drag" Telescoping Guard
- Cuts 2 x 4's at 45°

And many other professional features found in more expensive saws—yours at this low price.

ONLY **$39.95**



5-STAR 6½" Circular Saw
Model 146A

- Ball Bearings Throughout
- Exclusive Gear Lubricator
- Heavy-Duty Industrial Motor
- Blower Clears Line of Cut
- Calibrated Depth, Bevel Sets

A real professional saw but priced for the home workshop—a lot of saw at this price!

$74.95

BEVEL CUTS—Model 66 bevel cuts any angle from 0° to 45°—in 2" dressed lumber. Calibrated quadrant for accurate angles.

POCKET CUTS—Cuts openings quickly and easily in existing walls for windows, medicine cabinets, heat ducts, etc.

POWERFUL—Model 66 has power to spare for all homecraft work. Accessory rip guide is used for fast, accurate ripping.

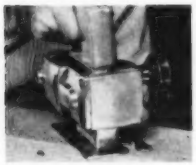
TELESCOPING GUARD—New design of telescoping guard eliminates jamming and "drag" at the start and during any type cut.

Electric HAND SAW

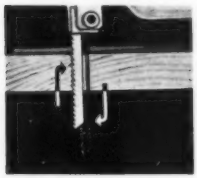
The most versatile saw you can own—it's actually 7 saws in one! Use it for hundreds of jobs—it's a rip saw, cross-cut, coping, key-hole, scroll, jig, and hacksaw. This Porter-Cable Electric Hand Saw is powered to handle the toughest cutting jobs on a wide variety of materials—handles 2" dressed lumber, 1/4" aluminum, 1/8" steel, plastics! It can be used for all types of intricate work, cabinet making, home construction, metal working and hobby projects.

Angle Cuts—equipped with calibrated angle base, cuts accurate angles up to 45°, even on 2 x 4's.

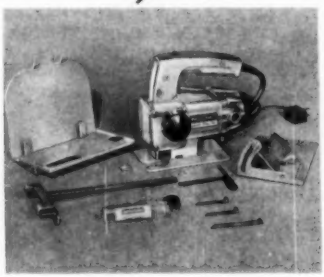
Metal cutting—sheet metal, pipe bar stock, rods are quickly and accurately cut with the 152.



Scroll work—makes intricate cuts easy—professional results every time.



Easy Cutting—improved orbital action does it—cuts smoother and blades last longer.



5-STAR Electric Hand Saw

- Orbital Blade Action
- 7 Saws in One
- Comfortable Top Handle, Switch
- Patented Magic Circle —No Chipping
- Cuts 2 x 4's at 45°

10 piece SAW KIT includes Model 152 Saw, handy wall bracket, angle base, rip guide, patented "insert disc", allen wrench, tube of grease, and 3 assorted blades.

Model 152K

$49.95

Limited Time Only

Portable ELECTRIC DRILLS

Versatile Porter-Cable Drills are widely used by builders, electricians, plumbers, farmers, and homecraftsmen because they are designed and built to rigid professional specifications. Each drill is powered by a specially designed heavy-duty motor and comes equipped with a precision gear chuck and key. And there's lots of extra power to drive the many handy attachments.

3-STAR 1/4" Drill **Model 161**

- Precision Geared Chuck
- Ball Thrust Bearing
- 3-Wire Safety Cord

And many other quality features such as insulated trigger switch with lock button, self-lubricating bronze bearings.

ONLY **$19.95**

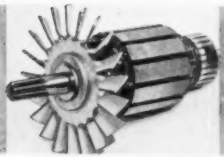
5-STAR 1/4" Drill **Model 107A**

- Extra Motor Power
- Man-sized Pistol Grip
- Compound Reduction Gears
- Ball Bearing Equipped
- Precision Geared Chuck

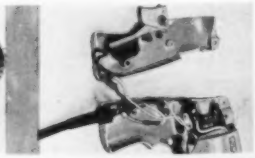
Special offset chuck and streamlined design permits accurate drilling to within 3/4" of any vertical or horizontal surface. Ideal for drilling in cabinet, millwork, automotive, repair and sheet metal shops, as well as in the home and hobby workshops.

ONLY **$34.95**

Drill gears are precision-hobbed from finest steel for maximum efficiency and long life. Proper gear reduction maintains correct drilling speed and efficient power transmission to drill chuck.



Motors are built under rigid specifications to eliminate vibration and to generate optimum power output for every drilling purpose. Highly efficient fan keeps motor cool.



Trigger switch for safe, "on-off" control. Cord strain-relief prevents kinking and dangerous wear. All wiring is plastic insulated and carefully installed to assure safe drill operation.

Miracle WOODWORKING TOOL

Make all the perfect advanced cuts that professional cabinet makers and carpenters do—cut grooves, dadoes, mortise door hinges, make rabbet, dovetail and other "lifetime" joints, cut inlays, fancy moldings—all with precision and slick edges. You can do all this, and more, with a Porter-Cable Router. It has many important and exclusive features such as lifetime sealed bearings, non-marking base, and a high-speed interchangeable motor that can be used with Power Plane and Shaper attachments.

5-STAR 7/8 h.p. ROUTER
Model 100

- World's Most Widely Used Router
- Interchangeable Motor Fits Plane, Shaper
- World's Finest Depth Adjustment
- Powerful Constant-Duty Motor
- Makes 100's of Ornamental Cuts

The home user can do his own grooving, weather-stripping and shelving as well as cutting all types of decorative edges, corners, surfaces—on wood, plastic, compositions.

4-STAR 1/2 h.p. ROUTER
Model 162

- Interchangeable Motor Fits Plane, Shaper
- World's Finest Depth Adjustment
- Smooth, Professional Cuts, Even on Ply.
- Light Weight

With this router home craftsmen can turn out professional projects in one evening. Over 150 bits and cutters are available. Hundreds of jobs can be done quickly, easily and expertly.

Canadian Prices Slightly Higher for Tools on This and Preceding Pages.

Use 5-in-one Magic Guide for circle cuts, radius cuts, ornamental designs accurate grooving, edge planing, spacing slots.

Interchangeable router motor may be used with Plane or Shaper attachments for high speed cutting combination.

Over 150 bits and cutters are available to provide a tremendous variety of useful and decorative cuts.

These Leading PORTER-CABLE DEALERS will help you

ALABAMA

Birmingham, J. A. McGwier & Sons, Inc.
Wood's Do-It-Yourself Center
Mobile, J. A. McGwier & Sons, Inc.

ARIZONA

Mesa, Stradling's Building Materials, Inc.

ARKANSAS

El Dorado, Timmins Hdwe. & Furn. Co.
Hot Springs, Vaughan Hardware
Little Rock, P C Hardware & Machinery Co.

CALIFORNIA

Anaheim, Martenet Hdwe.
Auburn, Alpha Hardware
Berkeley, Cards Dwight Way Hdwe.
Buena Park, Buena Park Lumber and Hardware
Castro Valley, Pete's Hardware Co.
Chico, Chico Hardware
Costa Mesa, Kerm Rima Hdwe.
Covina, Builders Emporium
Crescent City, Nielsen Hdwe. Co.
El Segundo, El Segundo Hardware
Fontana, National Hardware & Building Supply Co.
Fresno, Haven Machinery and Supply So.
Fullerton, Fullerton Hdwe.
Hayward, Skaggs Hardware Supermarts
Hermosa Beach, Rea's Hardware
Lafayette, Lafayette Rental & Hdwe.
Los Angeles, Andrews Hardware & Metal Co.
Lynwood, ABCO Hardware & Builders Supply
Marysville, Myers Hardware
Modesto, Turner's
Oakland, Haven Machinery and Supply Co.
Simon Hardware Company
Orange, Camp Hardware
Pasadena, John King Power Tools
Placerville, Placerville Hardware
Riverside, Builders Emporium
Sacramento, Haven Machinery and Supply Co.
San Bernardino, Cooley Hardware
San Diego, Point Loma Lumber Co.
San Francisco, Haven Machinery and Supply Co.
San Gabriel, L-S Tool Supply
San Jose, Haven Machinery and Supply Co.
San Mateo, The Ridley Company
Santa Ana, Clark Dye Hdwe.
Santa Clara, Santa Clara Hdwe.
Santa Rosa, Yaeger & Kirk Lumber Co.
Stockton, Turner's
Taft, M & N Supplies
Upland, W. F. Rugg Lumber Company
Van Nuys, Builders Emporium
Visalia, Sequoia Saw Service
Walnut Creek, Diablo Power Tool Co.
Whittier, Seemann Lumber

COLORADO

Denver, Associated Builders Supply, Inc.
Hendrie and Bolthoff Co.
Schlosser Equipment Co.
Lakewood, Creighton Hdwe Co.

CONNECTICUT

Bridgeport, Hawley Hdwe. Co.
Canaan, C. A. Lindell & Son
Centerbrook, S. M. Prann Co.
Fairfield, Tunxis Hill Hdwe. Co.
Hamden, Hamden Lumber Company, Inc.
Hartford, Irvin Hdwe. & Mach.
Meriden, Church & Morse, Inc.
Colony Hdwe. Co.
Middletown, Master Supply Co.
Naugatuck, Gans, Inc.
New Britain, City Grinding Hdwe. & Equip.
New Haven, N & B Sosensky
New London, Gruskin Hdwe. Co.
Old Greenwich, Sterling E. Watts
Ridgefield, D. F. Bedient
South Norwalk, Fox Cycle & Hdwe.
Stratford, H. C. Lovell Co.
Torrington, Union Glass Co.
Wallingford, Colony Lumber Co.
Waterbury, The Scigliano Lbr. Co.
West Haven, West Haven Lumber Co.
Wilton, Wilson Hdwe. & Supply

DISTRICT OF COLUMBIA

Fries, Beall & Sharp
The Hechinger Co.
R & M Saw & Tool Co.

FLORIDA

Bradenton, Simmons Hardware Co.
Clearwater, Nall Lumber Co.
Daytona Beach, Dunn Bros. Hdwe. Co.
Dunedin, Davis-Beatty, Inc.
Fort Lauderdale, Duncan-Edward Co.
Fort Myers, Fohl Hardware Co.
Fort Pierce, Fort Pierce Hdwe. Co.
Gainesville, Contractors Supply Co.
Homestead, Brooker Lumber Co.
Jacksonville, Southside Hdwe. Co.
Key West, Thompson Hdwe.
Lake Wales, Townsend Sash Door & Lumber Co.
Lake Worth, Leverenz Hardware Co.
Miami, Bailey's Lumber Yards
Renuart Lumber Yards, Inc.
Rowell Distributing Corporation
State Hardware & Builders Supply Co., Inc.
West Miami Key Shop
Ocala, Ocala Lumber Co.
Orlando, Bumby Hdwe. Co.
Thomas Lumber Co.
Pensacola, Taylor Hardware Co.
Pompano Beach, Pompano Lumber Company, Inc.
Punta Gorda, Punta Gorda Hardware
St. Petersburg, Peninsular Builders Sup.
Pinellas Lumber Co.
St. Petersburg Beach, Gulf Beach Paint & Hdwe. Co.
Sarasota, Sarasota Hardware and Paint Co.
Shepard Lumber Co.
Stuart, Casa Lumber Co., Inc.
Tampa, Peninsular Lumber Co.
Tampa Hardware Co.
Tarpon Springs, Burgess Hdwe. Co.
Vero Beach, Crosby Builders Supply Co.
West Palm Beach, Power Tool Service Co.
Sewell Hardware Co.

GEORGIA

Atlanta, Williams Bros. Lumber Co.

IDAHO

Boise, Safway Scaffold & Power Tool Co.
Coeur d'Alene, Campbell Hdwe.
Idaho Falls, Idaho Falls Hdwe. Co.
Rexburg, Graham Hdwe. Co.

ILLINOIS

Addison, Addison Hardware
Berwyn, Framar Sales & Service
Bloomington, Electric Motor & Repair
Blue Island, Mathieu Lumber
Chicago, AAA Saw & Tool Service
Advance Contractors Supply
Alta Products Co.
Andys Saw & Tool Service
Gee Co.
Grand Tool & Supply
Kabbe Hardware
Lakeside Supply Co.
Lee Supply & Tool Co.
Morgan Hdwe. & Supply Co., Inc.
Northern Industrial Supply
Olsen-Rite Corp.
Norbert Prehler & Co.
Shemroske Best Hardware
Stebbins Hardware Co.
Geo. Willy Hardware
Decatur, C. C. Hubbard Machine Co.
Des Plaines, B. F. Kinder's & Sons, Inc.
East Peoria, Builders Products Co.
Elmhurst, Soukup's Dept. Hdwe.
Freeport, Sanford & Zartman Lumber Co.
Geneva, Ace Store
Glen Ellyn, Schuham "The Hardware Man"
Glenview, Rugen Stores, Inc.
Godfrey, The Workshop
Greenville, Stratman Lumber Co.
Gurnee, Gurnee Hardware
Hillside, Merchant's Hdwe.
Kewanee, Blacks and Fletcher Hdwe.
LaGrange, Home Hardware
LaGrange Hardware
Lemont, A. Dalpes & Sons

These Leading PORTER-CABLE DEALERS will help you

Lombard, Ratke Hardware
Moline, Builders Lumber Co.
Morton, Roecker & Dietrich Hdwe.
Murphysboro, Edward's Hdwe. Co.
Naperville, Moore Lumber & Supply Co.
Northbrook, Northbrook Lumber Co.
Palos Park, Johnson Lumber & Supply Co.
Pekin, Walker Bros. Hdwe.
Peoria, Couch & Heyle
Stein Hardware & Supply Co.
Quincy, James Supply Co.
Rockford, W. T. Grant Co.
Springfield, James Machinery Co., Inc.
Sycamore, Sycamore Hdwe. Co.
Westmont, Suburban Cabinet & Millwork Co.
Wheaton, Hawthorne Hardware
F. E. Wheaton & Co., Inc.
Worth, Worth Hardware

INDIANA

Elkhart, Watson Paint Co.

IOWA

Davenport, Hanssens Hdwe.
Keokuk, Taber Lumber Co.
Ottumwa, O'Hara Hardware
Pella, Vogelaar's Hardware
Sioux Center, DeRuyter Hdwe.
Sioux City, Peets Hardware Co.
Spencer, Hughes Hardware
Waterloo, Cohn Bros., Inc.

KANSAS

Great Bend, Home Appl. Co., Inc.
Newton, Graber's Hdwe., Inc.
Wichita, Breese Hardware
Rock Island Lumber Co.

KENTUCKY

Louisville, Bailey Machinery & Supply Co.

LOUISIANA

Lake Charles, Home Supply Co., Inc.

MAINE

Brewer, C. Woodman Co.
Dexter, H. L. Tilson & Co.
Portland, Harris Company
Maine Hardware
Woodfords Hardware Co.
Sanford, Wilbur G. Shaw

MARYLAND

Baltimore, Fullerton Supply Co.
The Hardware Fair
Hobbywoods
Skorie, Inc.
Bethesda, Community Paint & Hdwe.
Strasnider Hardware
Cumberland, The Wilson Hdwe. Co.

MASSACHUSETTS

Boston, Highland Hdwe. Co., Inc.
Ross Cutter & Machine Co., Inc.
Fitchburg, Sabourin Hdwe. Co., Inc.
Holyoke, Tessier Millwork & Lumber
Lawrence, T. J. Scanlon Co.
Methuen, Spence Hdwe. Supply Co.
North Adams, Quinn Wallpaper & Paint, Inc.
Palmer, Faulkner Hdwe.
Pittsfield, Carr Supply Co.
Pittsfield Supply Co.
South Hadley Falls, Street Supply
Ware, Greenacres Supply, Inc.
Westfield, O. B. Parks Hdwe. Co.
Worcester, C. C. Adams Hdwe. Corp.

MICHIGAN

Battle Creek, Lakeview Hdwe. & Supply
Birmingham, A. L. Damman Co.
Coldwater, Kerr Hardware
Dearborn, Ace Hardware Depot
Chase Road Hdwe.
Detroit, Beatty Electric Tools
Bullock-Green Hardware
Butki Saw & Tool
Cadillac Tool & Hdwe.
A. L. Damman Co.
Dewey's Lumberville
Fiori Hardware
Fromm's Stores
Gamalski Hardware
Grandmont Hardware
J. L. Hudson Stores
Nowak Bros. Hdwe.
The J. L. Oswald Company
Waterston's
East Detroit, A. L. Damman Co.
Farmington, Ace Hardware Depot
Holland, Vogelzang Hdwe. Co.
Jackson, Casler Hardware
Kalamazoo, Lake St. Lumber Co.
Miller Lumber Co.
Lansing, Denstaedt's Hdwe.
Livonia, Cadillac Tool & Hdwe.
Monroe, Sam W. Morris Lumber Co.
Mt. Clemens, A. L. Damman Co.
Muskegon, Jones Electric Co.
Plymouth, Tommy's Hdwe.
Pontiac, McNabb Saw Service
South Haven, Goldberg's Hdwe. & Supply Co.
Utica, Larry's Hardware
Wyandotte, Jagers Hdwe.

MINNESOTA

Duluth, Duluth Ace Hdwe. #245
Hanson Ace Store #70
Grand Rapids, King Lumber Co.
Minneapolis, G. C. Peterson Machinery Co.
Moorhead, Red River Hdwe.

MISSOURI

Carthage, Carthage Hardware
Ferguson, Just Hardware Co.
Flat River, Decker Hardware
Imperial, Jefferson County Lumber Co.
Kansas City, Bunting Hardware
The Cabis Co.
Monett, Wilks Lumber Co.
St. Charles, Rauch Lumber & Grocery Co.
St. Louis, St. Louis Saw & Supplies
Sikeston, Lee Hardware
Springfield, Springfield Mill & Lumber Co.

MONTANA

Helena, Power Townsend Co.

NEBRASKA

Grand Island, Grand Island Hdwe.
Lincoln, Lawler's Ace Hdwe.
North Platte, Mac's Hardware
Omaha, Johnson Hdwe.
L. E. Nelson & Son Hdwe.

NEVADA

Reno, Commercial Hardware Co.

NEW HAMPSHIRE

Berlin, Morris Company, Inc.
Laconia, Laconia Electric Co.
Littleton, Grafton Building Supply Co.
Portsmouth, Harry B. Sawyer, Inc.
Rochester, Laconia Electric Co.
Suncook, Bailey Lumber Company

NEW JERSEY

Bergenfield, Bergen County Paint & Hdwe. Supply Co.
Camden, Jarvis Electric, Inc.
Power Tool & Equipt. Co.
Dover, The Handyman's Tool Shop
Chas. Harris Hdwe. Co.
East Paterson, Handy Man Shoppe Inc.
Egg Harbor, K & H Auto Stores
Flemington, Flemington Lumber Co.
Forked River, Bock-Supplies
Hackensack, McMannus Floor Mach. Co.
Zaentz Hardware
Hanover, Hanover Equip. Co., Inc.
Hillsdale, Marsala Hardware
Jersey City, Barnickel Hardware
Duncan Hardware, Inc.
Maplewood, Maplecrest Hdwe. Co.
Morristown, Slagle Bldg. Supply Co.
New Brunswick, Berman's Hardware
Newark, Clarke's Saw & Machine Works
Market Hardware Co.
Parsippany, S. Cerbo & Sons Lbr. Co.
Paterson, Neil Hardware Co.
Plainfield, J. D. Loizeaux Lumber Co.
Point Pleasant, Point Pleasant Hdwe.
Point Pleasant Beach, Post Lumber & Hardware
Ridgewood, Zabriskie Woodworking & Supply Co., Inc.
Succasunna, Homecraft Rental Service
Toms River, Sport & Hobby Shop
Trenton, Thomas M. Eagan & Son, Inc.
Gropps Appliance Rental
Union, Force Machinery Co.
Verona, Wright's Hardware
West Orange, Schneider Hdwe. Co.

These Leading PORTER-CABLE DEALERS will help you

NEW MEXICO

Albuquerque, Equipment Sales & Mfg. Company

NEW YORK

Albany, Rutland Lumber Co., Inc.
Bath, Longwell Lumber Company
Binghamton, H. C. Collier & Sons
Lou Rappaport
Brooklyn, Otto Herrmann, Inc.
Jacobs Hardware Company
D. Liederman & Son
Buffalo, Karle Saw Co., Inc.
Schuessler Hardware
Burnt Hills, Burnt Hills Supply Co.
Canandaigua, Lake Country Industries
Canastota, A. E. Dew & Sons, Inc.
Catskill, Dunn Builders Supply Corp.
Clyde, Jenkins Lumber Company
Corning, Riverside Builders Supplies, Inc.
Cortland, Acme Lumber & Supply
Dundee, Hepler's Hardware
Forest Hills, Kew Forest Lumber & Supply
Floral Park, J. F. Best
Flushing, ABC Tool Rental Sales Co.
Glen Cove, Steisel
Gloversville, House Beautiful Blinds
Granville, S. Weinberg Co.
Highland, Geo. W. Pratt & Son Lumber Co.
Hoosick Falls, Falls Hardware Supply, Inc.
Hudson, Hudson Lumber Supply Co.
Huntington, Huntington Hardware
Ilion, Best Enterprises, Inc.
Ithaca, Robinson & Carpenter, Inc.
Jamestown, Web Machinery Company
Jay, Ward Lumber Co.
Johnson City, Newman Brothers Hdwe.
Kingston, Shults Paint Co.
Lakewood, Brad's Hardware
Lyons, Santelli Lumber Company
Margaretville, Sanford's
Massena, Barstow Store, Inc.
W. L. Smith Hardware Corp.
Mt. Vernon, General Hardware & Paint Co.
Nedrow, Nedrow Lumber and Supply
New York, Rudolf Bass
Central Hdwe. & Elect. Corp.
B. Dulchin, Inc.
J. G. Wells Sales Co., Inc.
B. Wankel & Son, Inc.
Zelf Tool & Die Works
"The Rental Machine Shop"
Norton Hill, Greenville-Norton Hill Lumber Company, Inc.
Ogdensburg, Hackett's Hardware
Oneida, Oneida Hardware
Oswego, Neal O'Brien Lumber Co.
Potsdam, White Hardware Co.
Poughkeepsie, J. E. Andrews Hdwe.
Ravena, Edward G. R. Bourguignon
Rochester, Arrow Materials Corp.
Clarke's Hardware
The Country Gentleman
E. W. Edwards & Son
Henry Lester Hdwe. Co., Inc.
H. Clark Schoenholt
Schenectady, Capital Paint & Hdwe.
Cornell Lumber Co.
David Mahoney Co.
Smithtown, David Brown
So. Ozone Park, J & J Electric Co., Inc.
Spring Valley, Clarkstown Equip Co.
Syracuse, Alpar Hardware
Kelley Bros.
Mike's TV and Appliances
Ticonderoga, Moore Hardware
Utica, Jim's Hardware
Mather, Evans and Diehl Co., Inc.
J. R. McCoy and Sons, Inc.
Oneida Square Hardware
Victor, Victor Coal & Lumber Co.
Wellsville, Kailbourne Supply Co.
White Plains, Pickard Hardware
Yonkers, Rosners

NORTH CAROLINA

Elizabeth City, Culpepper Hdwe. Co.
Goldsboro, Live Wire Electric Co.
Greensboro, Southside Hdwe. Co.
Kinston, Grady's Building Supply & Hardware, Inc.
Midyette Hardware Co.
New Bern, Askew's Building Supply
Roanoke Rapids, Roanoke Builders Supply

NORTH DAKOTA

Fargo, Broadway Hardware
Grand Forks, Ace Hdwe. & Furniture

OHIO

Akron, Barberton Hardware
Carter-Jones Lumber Co.
W. E. Wright Shopping Center Stores
Alliance, Bowman Hardware
Bellefontaine, Milligan's, Inc.
Blanchester, P. E. Snyder & Son, Inc.
Bucyrus, O. F. Kime Lumber Co.
Canton, Canton Hardware Co.
Crystal Park Hdwe. & Supply Co.
Celina, Heckler Hardware
Chillicothe, Herrnstein Hdwe.
Cincinnati, Aufdemkampe Hdwe.
J. C. DeFinney Mach. Co.
Dettmer Hardware
David Pohl and Co.
Cleveland, Forest City Material
M. Freund Hardware
Odziemski Hardware
Rock Island Lumber Co.
WaySon Power Equipment Co.
Cleveland Heights, Kleinman Bros. Hardware
Columbus, Beechwold Hardware
Cohagan Hardware
Columbus Hdwe. Supplies, Inc.
Columbus Grove, Stechschulte & Son Hardware
Crestline, Holcker Hardware
Dayton, Flack Equipment Company
D. C. Mannier Woodworking
Tischer's Hardware
Defiance, Hoyt Hardware
Dover, Geo. B. Deardorff & Son, Inc.
Euclid, Grdina Hardware
Fairborn, Grimes Hardware
Galion, Galion Lumber Co.
Garfield Hts., Parkway Hdwe. Co.
Girard, Girard Hardware, Inc.
Kirtland, Kirtland Hardware
Lima, Stippich Hardware
Mansfield, Home Materials Co.
Marion, H. F. Baldauf & Sons Lumber Co.
Mentor, Mentor Hdwe. & Appliance, Inc.
Milford, Milford Hardware
Niles, Robbins Ave. Lumber
Paulding, Cassel's Gamble Store
Ravenna, Montigney Hardware
Salem, Glogan's Hardware
Steubenville, Fort Steuben Hdwe. & Supply Co.
M & M Hardware
Toledo, Center Hardware
J. S. Janney Hardware
D. J. Marleau Co.
Uniopolis, Shaw Lumber Co.
Warren, East Ohio Lumber Co.
Warren Hardware Co.
Wauseon, Farber & Meier Hdwe.
Willoughby, Le Wayne's Flower & Garden Center
Willoughby Hardware Co.
Wooster, Wooster Lumber Co.
Xenia, Xenia Hardware
Youngstown, Ace Lumber Co.
Stambaugh-Thompson Co.

OKLAHOMA

Oklahoma City, Pettee's Hardware

OREGON

Coos Bay, O'Dell Saw Service
Corvallis, Corvallis Home Town Hdwe.
Grants Pass, Rogue River Hardware
Medford, Hubbard Bros., Inc
Oregon City, Friedrich's
Salem, Salem Hardware

PENNSYLVANIA

Allentown, Allen Hardware, Inc.
Altoona, Force Electric, Inc.
Ambler, G. M. Deck & Sons
Bellefonte, Schaeffer Hardware
Charleroi, Charleroi Supply Company
Blue Ridge Summit, Flohr Lumber Co.
Bradford, E. W. Hdwe. & Ruth Bros., Inc.
Bristol, C. E. Stoneback & Sons
Cambridge Springs, Drake Hdwe. Co.
Cleona, Cleona Hardware Store
Colmar, Cottman Lumberteria
Doylestown, Al Bouc's Hardware
Easton, Miller Bros. Hardware
Elkins Park, Cottman Lumberteria
Hollidaysburg, Norman D. Wilt Hdwe.
Homestead, Levine Bros.
Honesdale, Murray Company, Inc.
Huntingdon, E. B. Endres Lumber Co.
Mansfield, Mansfield Novelty Co.
McKeesport, Ungar's Hardware
Media, Bill Feininger
Myerstown, Wilhelm's Hardware
Nazareth, Nazareth Tool & Supply Co.
New Cumberland, West Shore Hardware Co.
Northumberland, Broscious Lumber Co.
Oxford, George Fredd & Son

POPULAR SCIENCE

These Leading PORTER-CABLE DEALERS will help you

Philadelphia, Carpenters Machinery Co.
Cottman Lumberteria
Peter Lumber Company
Power Tool Company
Jos. Weber Hardware
Pittsburgh, Columbia Machinery & Supply Co.
Fort Pitt Hardware Co.
Jones Equipment Co.
Mihm Tool Supply
Reading, Melco Hardware
Merritt Lumber Yards
Schuylkill Haven, Haven Hardware
Shamokin, Jones Hardware Co.
Sharon, Flower Lumber Co.
Southampton, Weber Hdwe. & Supply
Tremont, Tremont Hardware
Warren, Service Hardware
Williamsport, Hermance Machine Co.
Windsor, Jacobs Lumber Co., Inc.

RHODE ISLAND

Providence, City Hall Store

SOUTH CAROLINA

Columbia, Ruff Hardware Company
Stier Supply Company
Rock Hill, Rock Hill Hardware Co.

SOUTH DAKOTA

Aberdeen, Witte Hardware
Huron, Waibel Hardware Co.
Redfield, Parson's Hardware
Sioux Falls, Decker-Delta Shop
Watertown, Nelson Hardware

TENNESSEE

Chattanooga, Crisman Hardware Co.
Goodlettsville, W. C. Moncrief Co.
Knoxville, Dick Wright Hdwe. Co., Inc.
Lebanon, Wilson County Hdwe. Co.
Memphis, C. E. Thompson Lumber Co.
Nashville, Keith-Simmons Company
Tennessee Machinery Company

TEXAS

Borger, Four R Industrial Supply Co.
Dallas, Briggs-Weaver Machinery Co.
E & L Service Shop
Home Workshop Tools of Dallas
T. Raymey Co.
Wiseman Hardware Co.
Fort Worth, Briggs-Weaver Machinery Company
Leonards
The Jno. Muller Company
Pioneer Traders
Houston, Egner Brothers
Foley's
Wessendorff, Nelms & Co.
La Feria, Ed R. Kennedy Industrial Tools & Supplies, Inc.
Longview, Machinery Supply & Grinding Co.
Nacogdoches, Cason, Monk & Co.
San Antonio, Gates Saw & Tool Works
Tyler, Mason Machinery Company
Tyler Machinery & Supply

UTAH

Salt Lake City, C and L Supply Co.
Power Tool Center

VERMONT

Bennington, H. Greenberg & Son
Brattleboro, Holden & Martin Lbr. Co.

VIRGINIA

Anandale, Star Supply Co.
Charlottesville, Charlottesville Hdwe.
Covington, C. B. Nettleton Bldg. Supplies
Danville, Link-Watson Corp.
Falls Church, Fallfax Building Supply
Norfolk, Cavalier Lumber & Bldg. Supply
Richmond, J. P. Long Co.
A. L. Lorraine Hdwe. Co., Inc.
Puckett Hardware
Guy Smith Hardware
Vienna, Vienna Bldg. Supply Co., Inc.
Virginia Beach, Fuel Feed & Bldg. Supplies
Williamsburg, Williamsburg Hdwe.
Wytheville, R. P. Johnson Sons

WASHINGTON

Aberdeen, Harbor Hardware
Bremerton, Charleston Hardware
Clarkston, Schurmans' Hardware
Everett, Weld Hardware
Hoquiam, Ace Electric
Newport, Vanairsdale Hardware
Puyallup, Lepley Lumber
Seattle, Aronson's Hardware Co.
Buckner-Weatherby Co., Inc.
Carrigan Hardware
Crawford-Waage Hardware
Logan Lumber Co., Inc.
Sand Point Builders Supply
Spokane, Hoeslys' Hardware
Tacoma, Tucker & Son Hardware
Washington Sports Shop
Webster Robinson

WEST VIRGINIA

Huntington, Chandlers Plywood Products

WISCONSIN

Appleton, W. T. Grant Co.
Beaver Dam, Luken Lumber Co.
Beloit, Rock River Lumber Co.
Fond Du Lac, Wisconsin Lumber Co.
Kenosha, Josephson & Thomey Hdwe.
Manitowoc, W. T. Grant Co. (Park Plaza)
Marshfield, Pritzl Hardware
Menomonee Falls, Neu's Supply Line, Inc.
Milwaukee, W. T. Grant Co. (Southgate)
L. W. Meyer & Son
Reinhold Ace Hardware
Stollenwerk Hardware Co.
Storck Ace Hardware
Winkelman Ace Hardware
Neenah, Wm. Krueger Co.
Park Falls, John Peterson Lumber Co.
Racine, Machinery & Factory Equip. Co.
Sheboygan, Trilling Hardware Co.
Sparta, Sparta Lumber & Fuel
West Allis, Nels Ace Hardware
Wisconsin Rapids, Guarantee Hardware

ALASKA

Juneau, Lyle's Hdwe. & Furniture Co.

CANADA

(Canadian Prices Slightly Higher)

ALBERTA

All Branches
The Monarch Lumber Co., Ltd.
Calgary, Disher Equipment, Ltd.
Electric-Crafts, Ltd.
Edmonton, Disher Equipment, Ltd.
Woodwards Stores (Edmonton), Ltd.

BRITISH COLUMBIA

Vancouver, Disher Equipment, Ltd.

MANITOBA

All Branches
The Monarch Lumber Co., Ltd.
Winnipeg, Luke's Electric Motors & Machinery Co., Ltd.
Saw Service Shop

ONTARIO

Belleville, Walker Hardware, Ltd.
London, Lion Auto Supply
Ottawa, Charles Ogilvy, Ltd.
St. Catherines, McNeils Hardware
Toronto, Aikenhead Hardware, Ltd.
Power Tool Centre
Willowdale, Lansing Building Supplies, Ltd.

QUEBEC

Montreal, J. Pascal Hdwe. Co., Ltd.
Rutherford Home Improvement Centre
Omer de Serres, Ltd.

SASKATCHEWAN

All Branches
The Monarch Lumber Co., Ltd.

GUAM

Permanente Cement Co.

HAWAII

Hilo, Hawaii Planing Mill, Ltd.
Honolulu, City Mill Co., Ltd.
Lewers & Cooke, Ltd.

ISRAEL

Tel Aviv, L. Edelsburg & Sons, Ltd.
57 Herzl St.

MEXICO

Mexico City, D.F.
Cia. Gral Distribuidora S. A.
San Antonio Abad 236

Advertisement

Short Cuts and Tips
FROM PS READERS

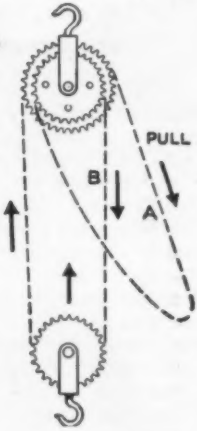
How to Make Doors from Stock Lumber and Glass-Fiber Panels

THE panel of corrugated glass fiber in this door gives you both light and privacy. The door has two frames—one made of one-by-fours, the other of one-by-sixes—glued and nailed together. The 2" difference makes a rabbet to receive the panel, held by 1" #6 oval-head screws and washers. The door can be made up to 34" wide with a standard 26"-wide glass-fiber panel. Half-lapped joints formed by the double frames strengthen the corners.—*Paul Corey, Sonoma, Cal.*

▶▶▶FUEL oil spilled on concrete can be soaked up by sprinkling fuller's earth generously on the area. Let it lie until it sweeps away cleanly, leaving no stain on the concrete.

▶▶▶WHEN I paint storm windows, I stack them to dry with wads of crumpled newspaper between the panes. That saves space and lets air circulate over the paint. —*John R. Hennen, Chicago.*

Answer to the Bicycle-Chain Hoist Problem on Page 168



IT WOULD not work. The two upper sprockets must be of different sizes. As the endless chain is pulled down at A, it tends to lift the lower sprocket with the load. But meanwhile, side B of the chain is dropped by rotation of the smaller sprocket (which is fixed to the larger). The net lift is the difference between the two chain movements: the more nearly the two sprockets are of the same size, the smaller the amount of lift but the greater the mechanical advantage gained.

Thus if the big sprocket has 20 teeth and the smaller 19, the lifting force will be 40 times the pull exerted on the chain. But if both sprockets are the same size, there will be no differential action between the two—and, of course, no lift.

Who Says a Light Meter Can't Lie?

THIS PRIZE SHOT COULD HAVE BEEN A FLOP because original reading, with meter held at camera, recorded brilliant white back wall. This would have underexposed girls and dog. Moral: Get in close so the meter reads only light from the subjects.

It can, and will, if you don't watch out. Here are situations where it might have—but didn't

By Phil McCafferty

A GOOD light meter can be a photographer's best friend. Trouble is, it can't think. So it calls 'em as it sees 'em. When the results are poor, you can usually blame one of two things:

• The meter tends to strike an average. A meter looks where it's pointed—often an area much larger than the camera lens covers—and totals up the brightness and shadow it sees. It delivers a neatly rounded average figure, with no regard for what may be the *important* part of the scene. That part is up to the man behind the camera.

• The film doesn't "see" nearly as well as your eyes do and can't fully record extreme variations in brightness. When exposure is incorrect, you're being cheated out of detail or true colors.

You can make your light meter tell the truth by eliminating its opportunity to lie. It's that simple. Force the meter to read the light you want it to read. Nearly always, this means forcing it to read the light affecting the part of the subject that is most important to you.

OPEN-SHADE SCENES give meters the least opportunity to lie because light is soft and diffused, and shadows are open, showing detail, or are nonexistent. But bright sun beyond shade will give falsely high reading, causing underexposure, unless reading is taken close to subjects. With an incident meter that measures direct light, be sure only shaded light hits it.

EXPOSING FOR THE SKY is the only way to capture full beauty of sunset and sunrise. To expose for both sun and clouds, average two reflectance readings—one pointing directly overhead, one at sun. Convert incident meters for reflectance readings. Foreground detail can be added by increasing exposure about one *f* stop, but at the cost of washing out sky.

TO GET DETAIL in wide-contrast scenes, read lightest and darkest areas close up, or take substitute readings as above. Point midway between high and low readings will give good exposure, providing spread does not exceed film's range. If it does, shift toward more important end. Figure a range of three *f* stops on color and fine-grain b&w film, six on medium-speed b&w. Where there's leeway, adjust setting to best suit people or medium tones.

CONTINUED

A "proper" exposure would have spoiled both of these pictures

HARD SHADOWS on this little girl's face would result if reading were taken off portion of face in bright sun. Underexposure would cause loss of detail in shadows. Best scheme is to average out readings on *both* sides of face. Fill-in flash can be used where shadows are so heavy that allowing enough exposure to soften them would badly overexpose the light tones.

DEEP SHADOWS in this shot, unlike picture at left, add to its interest. A normal meter reading, although technically "accurate," would have resulted in merely a picture of junked wagon wheels, instead of a striking study in texture and pattern. Decreasing exposure one full *f* stop, to make sure that little detail would show up, created the rich, sharp shadows caught here.

Four ways to keep your meter honest when it's tempted to fib

CLOSE-UP READINGS eliminate most meter fibs by excluding stray light. This is especially important with incident meters when light varies sharply from camera to subject, as here.

READ YOUR HAND when a subject is too far away to reach. Hold it not more than 5" from the meter at same angle as light hits subject and so meter doesn't read its own shadow.

TILT METER DOWN slightly when reading distant scenes to lessen influence of a bright sky. With incident meter, point it at camera and be sure the same light falls on it as on the scene.

SNOW AND BEACH SCENES are often overexposed because of terrific brightness of reflective surfaces. If you want texture in snow, as here, take close-up readings of light and dark areas, and expose one stop *less* than halfway point. For shadow detail, shoot at halfway point.

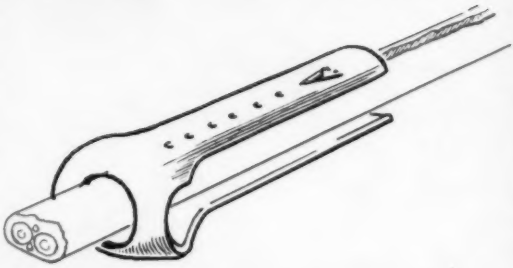
USE A BUILT-IN METER like a separate one by moving camera to subject for reading. With self-adjusting type, note lens opening at subject, then use flash control to lock opening.

BACK-LIGHTED WATER, with sun coming toward you, tends to give higher reading (lower exposure) than is correct for scene's middle tones. For right middle-tone exposure, take substitute reading off your hand. If you want texture in water, however, use direct reading of scene.

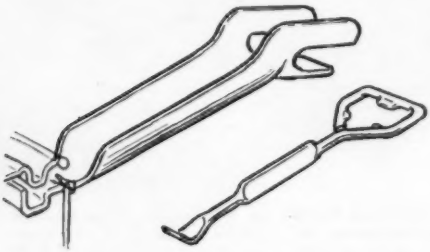
11 Special Tools

By Ernest E. Hickman

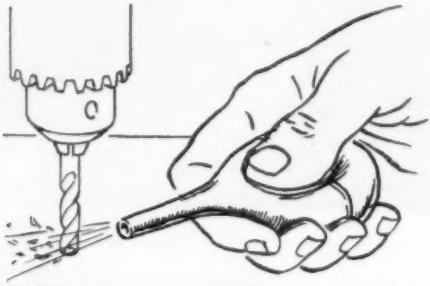
THESE small tools carry the "indispensable" label. They've earned it in widely separated trades and professions. Through constant use and improvement, each has been developed to perform a specific function the best and easiest way possible. But because their functions can be filled by makeshift substitutes, few of these tools find their way into home shops. The household jack-of-all-trades, however, will find that experts' tools quickly pay their way with savings in time and effort. And their way isn't expensive. Few cost more than a dollar; most of them far less than that. Some are advertising give-aways.



Electrician's cable ripper strips unarmored cable (type NM) without injury to insulation. Place ripper over cable, squeeze and pull to slit sheath. First use is worth 25¢ cost of the tool at electrical-supply and hardware stores.

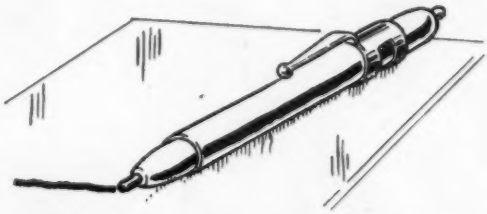


Painter's can opener has upturned tip to get beneath can lip. Tool opens paint cans faster and easier than screwdriver, leaves top undamaged for tight seal. Sometimes a give-away, lid-lifters can be bought for about 25¢ at paint stores.



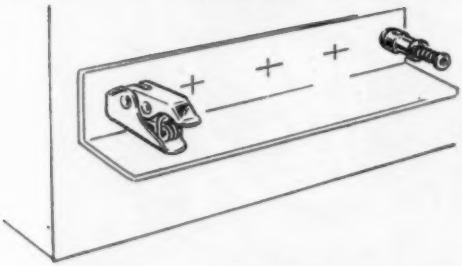
Physician's ear syringe squirts coolant for drilling and grinding. Dry, it puffs dust out of hard-to-reach places such as camera interiors, dowel holes. Drug stores offer rubber or plastic syringes in several sizes, most for less than $1.

Steamfitter's chain wrench grips all household pipe fittings and irregular shapes, saves rental or purchase of infrequently needed large pipe wrenches. Small size sells for about $4 at most auto-supply, tool and hardware stores.

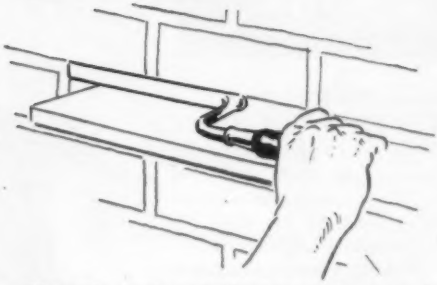


China-marking grease pencil writes on metal or glass, can be rubbed or washed off. Handy to identify parts, indicate hard-to-see pencil marks on shiny metal. Pencils sell for 10¢ up, at stationery and variety stores, come in many colors.

It Pays to Own

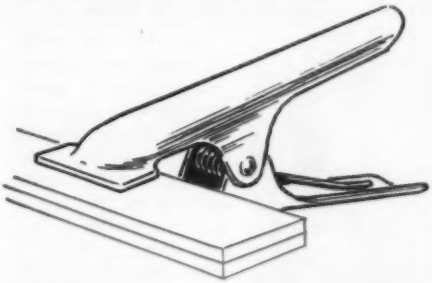


Aircraft-riveter's skin clamps grip from one side through predrilled pilot holes. You can get them at airport-supply stores, factory shops. At surplus sales, they often sell for less than 15¢, but may require an outlay for special pliers.

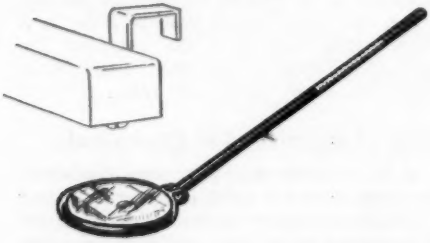


Mason's tuck-pointing trowels come in several widths, are ideal for filling voids in mortar joints. Use them wherever a regular trowel won't fit or where you need a straightedge. From $1.25 at most hardware stores and lumber yards.

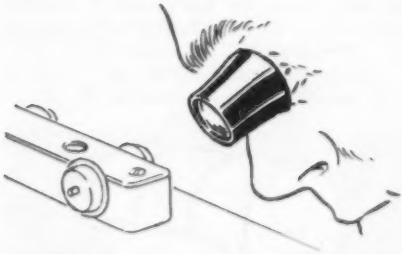
Carpenter's nail apron saves trouser pockets by holding ever-elusive chuck key, pencil, nail set, rule, other small tools. Or it will hold nails for big jobs. Lumber yards and hardware stores have several types from 35¢ upwards.



Welder's clamps are oversize versions of familiar spring clothespins. Placed with one hand, they make good "third hands" when working alone. They come in several sizes, cost 50¢ up at hardware, auto-supply, welding-supply stores.



Dentist's mirror inspired heavier-duty industrial inspection types to put your eyes where your head can't reach. Many variations available, including one with self-contained light. From 35¢ at radio-, auto-, factory-supply stores.



Jeweler's loupe gives one eye a magnified close-up, leaves other one normal. Clip-on models fit regular eyeglasses. Prices start at $1 for imported ones at tool, hobby, jewelers'- and watchmakers'-supply stores. Some models fit both eyes.

Short Cuts and Tips
FROM PS READERS

Easy-Cleaning Window Wells

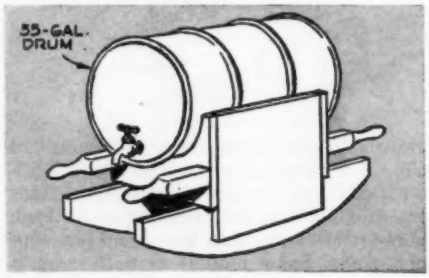
AN EASY way to clean out leaves and trash collected in your basement-window wells is to lift the stuff out in custom-fitted baskets.

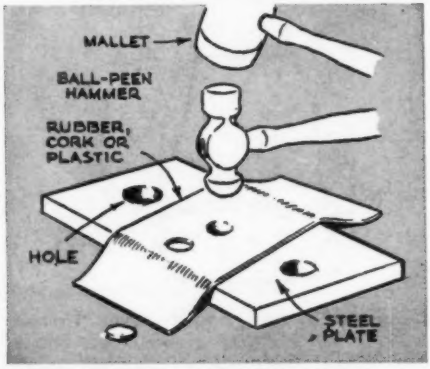
Make the baskets of hardware cloth—one for each well. Snip out the corners of a sheet with tin shears or wire cutters and bend up the sides. For rounded edges, make cuts at 7" intervals so the wire overlaps and fits snugly at the top.—*Ruth Bauman, Somerset, Pa.*

Oil-Can Spout Squirts Glue

AN OIL-CAN spout makes it easy to pinpoint dabs of glue, and saves waste and mess. Many standard-size spouts can be press-fitted into the tops of glue cans. A small ball of putty or caulking compound will plug the spout when the glue is stored away.—*Ken Murray, Colon, Mich.*

▶▶▶AVOID placing a television set too close to a house thermostat. The heat it generates may keep the thermostat's contact points open—and the furnace idle—when room temperatures are well below that for which the indicator is set.—*Charles V. Mathis, Wildwood-by-the-Sea, N. J.*





Punching Soft-Material Disks

A SIMPLE way to cut small disks or washers from rubber, cork or other soft material is to punch them from sheets. Place the sheet stock over a hole in a steel plate, and cut the material by pounding with a ball-peen hammer.—*Hugh Lineback, Stillwater, Okla.*

Barrel Agitator for Chemicals

A MINNESOTA state park uses this barrel on rockers to get more uniform mixtures of DDT and other chemicals. The barrel is equipped with two steel-tired wooden rockers. The handles make agitation easier and also afford a means by which the rocker may be easily carried from one place to another. Tipping the device makes filling a bucket easy, too.—*William Ludwig, St. Croix State Park, Minn.*

OPEN DOOR REVEALS COMFORTS—chair, sheltered cab, protected shelf for shells. The original blind weighed less than 100 pounds.

WATERTIGHT BOTTOM makes blind easy to move in shallow water. The blind is camouflaged by bundled grass stapled to its plywood sides.

How a hunter built a

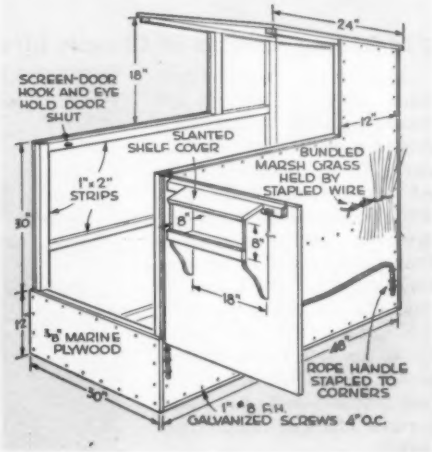
Portable Duck Blind

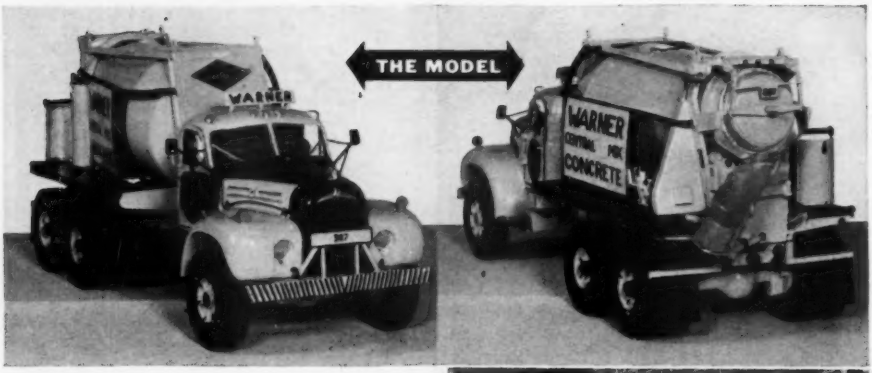
ARE those ducks always just out of reach of the blind? You can end that trouble with this portable job.

One man can float it on only a few inches of water. Or two men can pick it up and carry it. The blind is boarded only when grounded, however. It's too unstable to use as a boat.

Marsh-grass camouflage hides a comfortable chair and generous weather protection. The half-roof keeps rain and snow away from the hunter's neck, but leaves him room for unhampered shooting. A shelf keeps shells dry and handy.

As built by Arthur Dierker of Chestertown, Md., the blind was equipped with windbreaks made from old auto side curtains. He built the rest of the blind from 3/8" marine plywood, stiffened and joined at the corners by inch-wide strips ripped from two-inch plank. Stock one-by-two would do equally well, however. Marine bedding compound and closely spaced screws seal the plywood seams.





Truck Driver Models His Own Truck

BUILDING a model of a B42 Mack concrete mixer was a truck-driver's holiday for Richard M. Plude. That's because his finely detailed miniature is an exact reproduction of the full-scale rig he's been wheeling in and around Chester, Pa., for the past year.

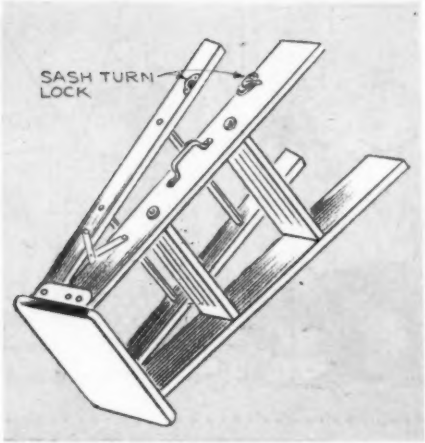
Twenty-six years old, Plude admits he took up modeling trucks long before he got his first job driving highway haulers. But his practical knowledge now helps him in his hobby craft. Along with the mixer, his collection of authentic midgets includes a DC907 Autocar tractor and trailer, an RCTD International tractor, and a 9000-series White diesel. The ½"-scale models were made mainly of balsa and white pine. For the tires and other wood turnings, birch and similar close-grained hardwoods were used. All parts were sealed with shellac and carefully sanded to a metal-smooth finish before high-gloss enamel was applied.

Big Riding Models of Classic Little Cars

JOHN KUCHERA, of Sherman, Wyo., applied his modeling skill to one-third full-size copies of antique cars. His handsomely crafted 1903 Oldsmobile and 1913 Ford runabout are impressive performers, too. Powered by three-horse one-lungers, they whisk his 14-year-old daughter around the family plot at 10 and 17 miles per hour respectively. The Olds has a slip-belt transmission; the Ford, a more efficient centrifugal clutch.

Short Cuts and Tips

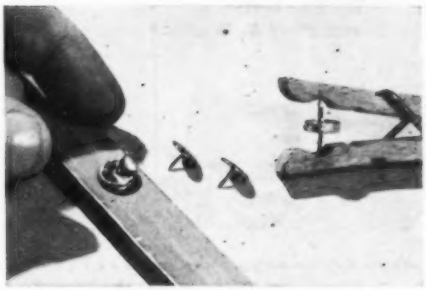
FROM PS READERS



Packaging a Stepladder

CARRYING or storing a stepladder can be made easier by holding the legs together with an ordinary window-sash lock as shown. A handle screwed to one side at the balance point helps, too.—*Murray W. Telsworth, Holly, Mich.*

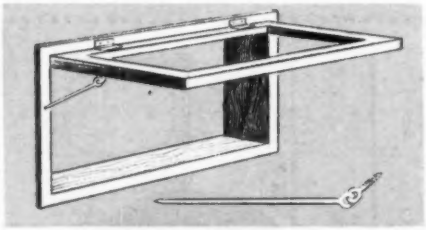
▶▶▶WHEN I have to make cold-weather car repairs in my unheated garage, I put a heat lamp in an extension cord and hang it above the spot where I'm working. In addition to warming my hands and taking the chill out of metal tools and parts, the lamp provides good light for my work.—*Ed Stribley, Sioux City, Ia.*



How to Make Pin-Up Pictures

YOU can make pin-ups out of small pictures. Solder two all-metal thumbtacks together head-to-head, holding them in a spring clothespin. Then push one point into the picture frame, the other point into the wall.—*K. Mathis, Detroit, Mich.*

▶▶▶AFTER I lost a plastic control knob from my outboard motor, I made a substitute from a plastic bottle cap. I filled the cap first with epoxy putty, then positioned it on the threaded lever. The new knob is larger than the original and easier to grip, even when my hands are wet. —*R. M. Woodbury, Natick, Mass.*



Permanent Prop for Cellar Sash

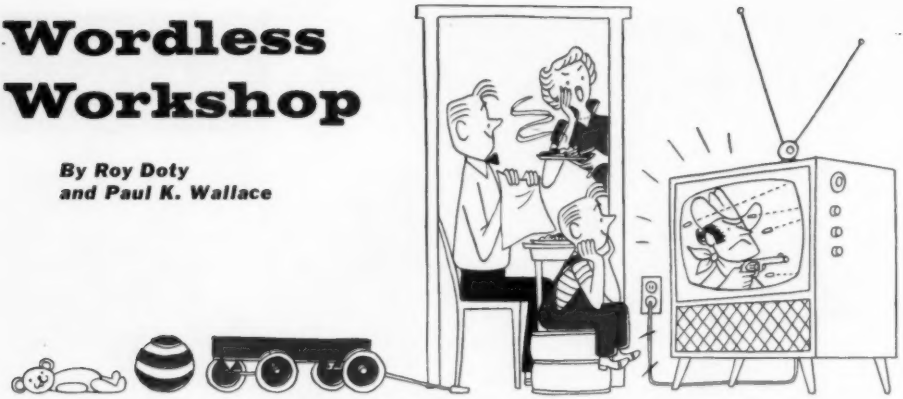
MAKESHIFT props to hold basement windows open can be eliminated by a length of stiff wire or rod. Hooked into a screw-eye on the outside of the sash, the prop hangs outdoors. When the window is raised, the prop is swung against the frame to support the sash. A sharpened point keeps it from slipping off the frame.—*G. E. Hendrickson, Argyle, Wis.*

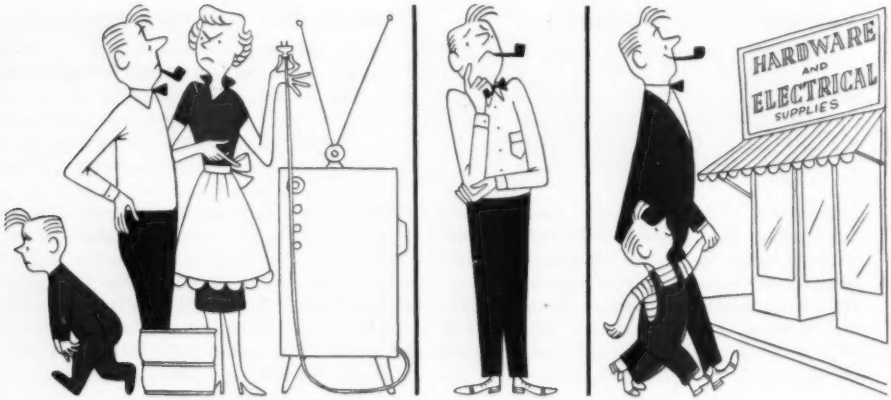
Cleaning Brushes in a Bag

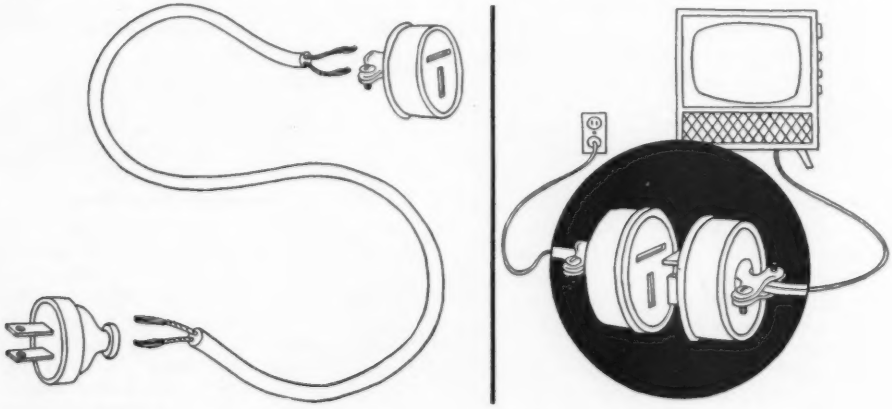
EVER wish you could knead strong solvent through paintbrush bristles without getting it on your hands? You can if you put the solvent in a tough plastic freezer bag, then tighten the bag around the brush handle. The pliable, transparent plastic lets you see what you're doing, but keeps your hands clean and safe.—*Duane C. Honsowetz, Bath, Mich.*

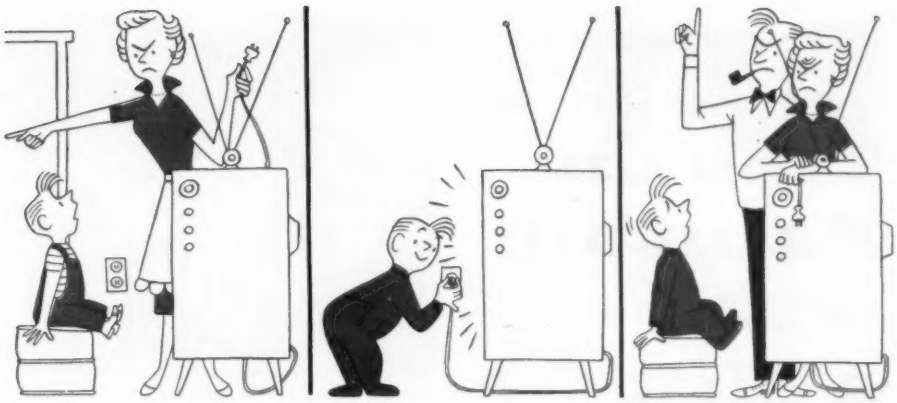
Wordless Workshop

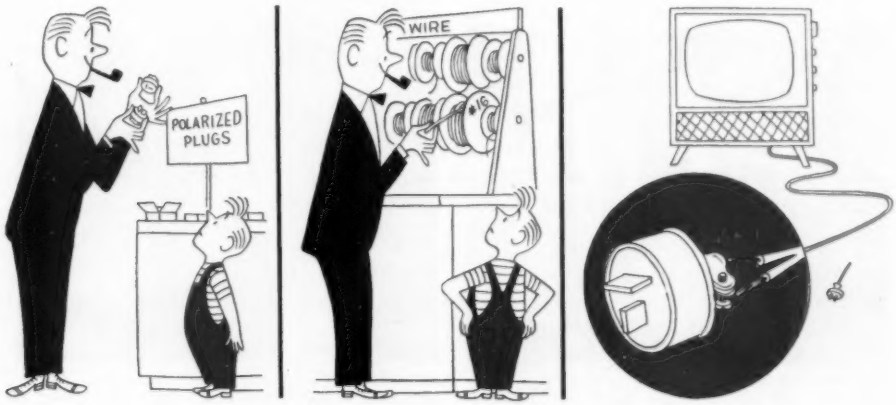
By Roy Doty
and Paul K. Wallace

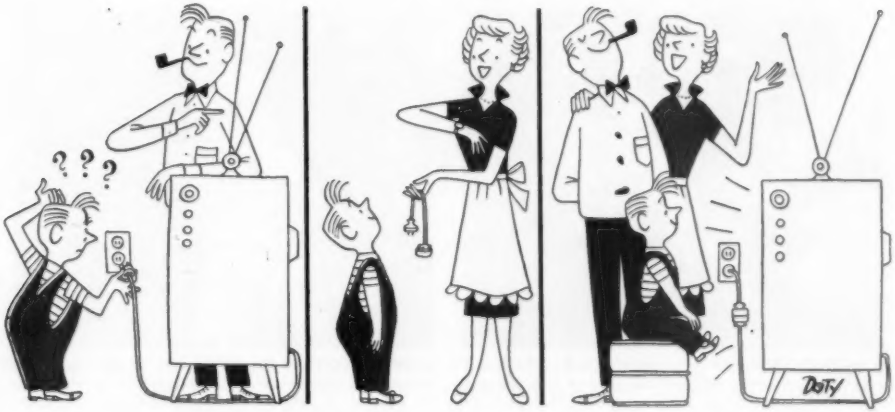








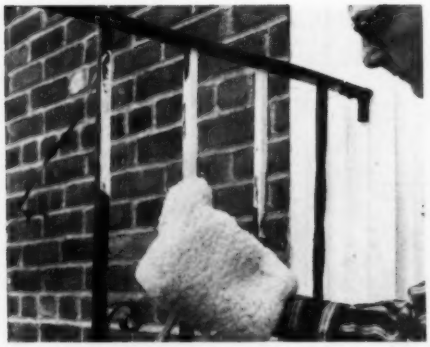

POLARIZED PLUGS
WIRE
#16


? ? ?
DOTY

Here are ways you can use a lambskin mitt to supplement brush, roller, even a spray gun

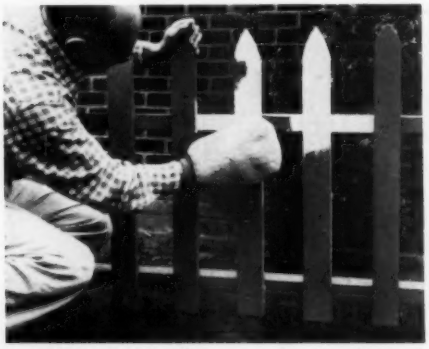
Tips on Painting with a Mitt

PAINTING A CHAIR is much less tedious when you use a mitt. Encircle one of the rounds with the mitt, make a swipe up and down or back and forth and the entire round is painted.



GRILLEWORK at front door is a logical spot to use mitt. And you can apply paint with the back of the mitt as well as the front, a point to remember for painting scrolls like this.

DOWNSPOUT is another of the many places around a home where you might want to use a mitt. Mitts are available with and without a thumb. The latter type is usually reversible.



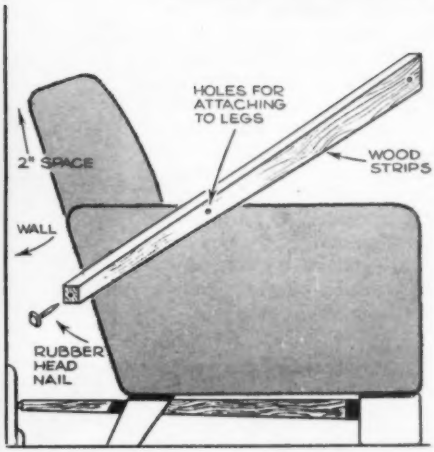
A PICKET FENCE? Close your hand a bit and apply paint to the edge of the picket at the same time you apply it to the surface. (Photos courtesy of Bestt Rolir Co., Fond du Lac, Wis.)

SUPPORT POST in the basement, or any exposed plumbing pipe—use a paint mitt to do the job. It's always handy on a curved surface. The mitt is easily cleaned, just like a paint roller.

Short Cuts and Tips
FROM PS READERS

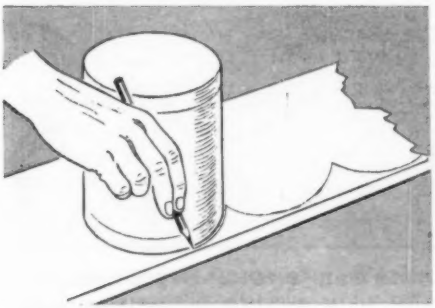
Inlaid-Wood Sandwich Board

THIS sandwich board with an inlaid Old English initial can be made from a ¾″-by-8½″-by-15″ piece of hard maple. The initial is routed or carved for a depth of ⅛″ and filled with walnut wood putty. Put in enough putty to form a raised ridge $\frac{1}{16}$″ and then sand the entire board until the inlay is flush with the surface. —*Frank Lawrence, Portland, Me.*



Spacer Strips on Furniture

HEAVY pieces of furniture shoved back against a wall will show wear, and mark the wall in time. You can avoid this by screwing inside the legs or the underside of the frame a light strip of wood long enough to strike the baseboard and leave a 2″ clearance. Drive a rubber-head tack in the end to keep from marring the baseboard.—*Harold Jackson, Kankakee, Ill.*



Template for Scallops

AN EMPTY tin can of required size makes a good template when you lay out scalloped edges for plywood valances and similar projects. Hold the can on the spot and mark a line for the coping saw. —*Ross Plaisted, Painesville, Ohio.*

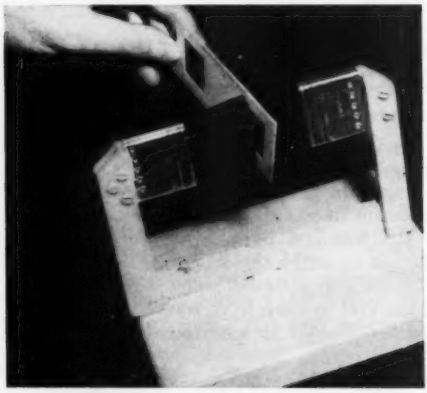
Padded Binoculars

IF YOU wear eyeglasses when looking through binoculars, you can keep from scratching the lenses by padding the eyepieces with circular corn or bunion plasters. The adhesive will hold them in place.—*Amos D. Jordan, Fresno, Cal.*

Short Cuts and Tips
FROM PS READERS

Plastic Tubes for Miniature Parts

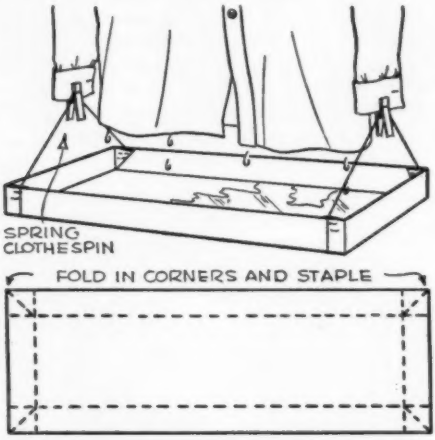
THOSE clear-plastic tubular containers that bouillon cubes come in provide excellent storage for tiny screws, nuts and other parts used in radio and electrical work. You can glue a shelf in the center of a hinged cigar box, mount the box on a wall and have a convenient cabinet.—*T/Sgt. James R. Brown, Fairfax, Va.*



Dusting Both Sides of Slides

YOU can remove dust particles from both sides of a projection or stereo slide at the same time with two small soft brushes mounted on a wooden frame. Cut off the handles and screw them to uprights with the ends just touching.—*Harry Radzinsky, Hollywood, Fla.*

▶▶▶TO PREVENT loss of alignment when removing paper laid between surfaces being contact-cemented, I use two overlapping sheets. I hold one, pull out the opposite sheet. When the glued surfaces make contact, the second comes out easily. —*Bob Aguirre, Inglewood, Cal.*



Making Ornamental Hinges

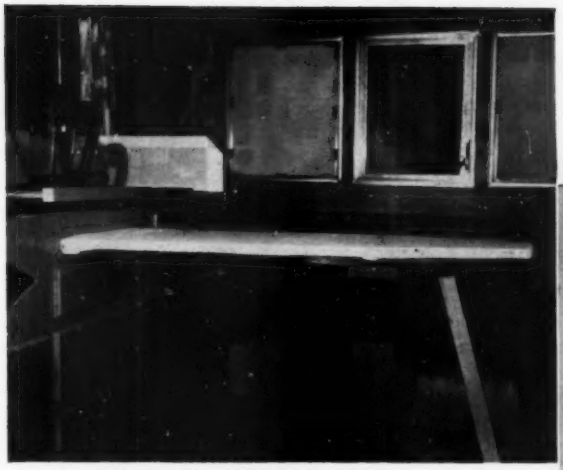
YOU can make imitation H and L hinges with corner angles tacked beside mortise hinges. Use ornamental nails and paint the two-piece hinges dull black.

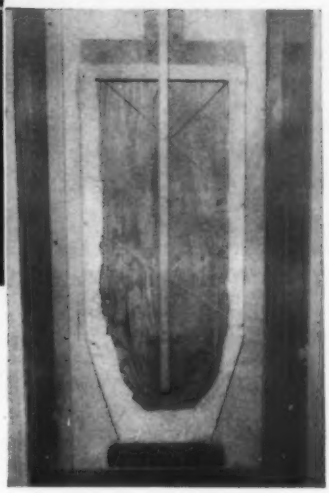
Drain Pan for Drip-Dry Shirts

NO ROOM over the tub to hang your drip-dry shirts? You can make a drain pan with a length of kitchen aluminum foil. Tear off a piece about 6″ longer than the width of the shirt, fold to make a shallow box and staple the corners. Hold it to the shirt cuffs with clothespins attached to cords stapled to the corners.

Short Cuts and Tips

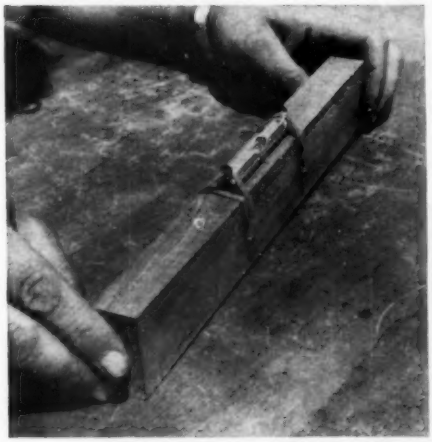
FROM PS READERS





Ironing Board for Trailers

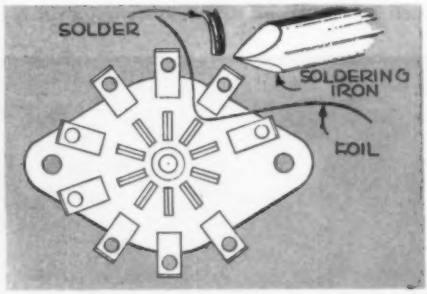
MAKE a trailer ironing board the same size as the breadboard in the kitchen. Then use the breadboard slot to support one end. Hold the other end with a wooden leg, fastened to the board between two pieces of angle. Store the board against the wall with the small end in a wooden pocket.—*Walter J. Luxenburg, San Diego, Cal.*



Line Level for Carpentry Work

A CARPENTER'S level is often too long for work in a confined space. Improvise a short level for this work from a line level and a short length of hardwood. Fasten the line level to the wood with four screws and two rubber bands. For precise work, plane top and bottom truly parallel.—*E. J. Schneider, Doylestown, Pa.*

▶▶▶YOU can easily fill an air mattress with excess air from the spare tire. Use a short length of hose with air fittings and keep the spare tire over-inflated by 10-to-20 pounds.—*Ken Murray, Colon, Mich.*

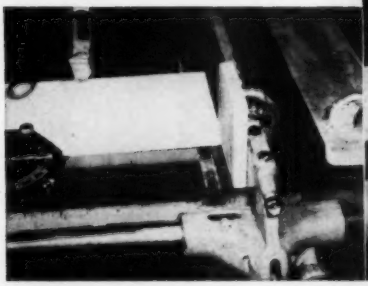


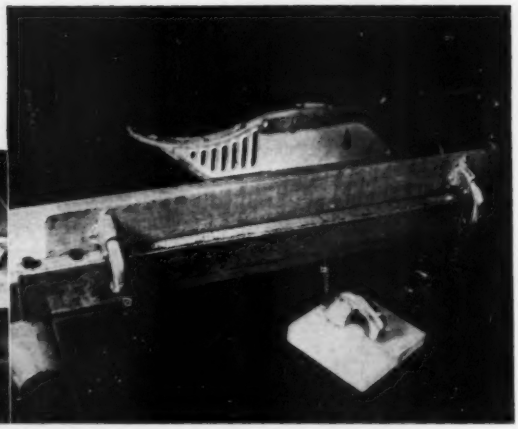
Guard Against Dripping Solder

WHEN soldering a TV in tight places, there is always danger of solder dripping on other joints, running them together or to ground. You can prevent this with a piece of aluminum foil. Insert the foil around the terminal as shown. This is especially helpful when the chassis is turned on its side.—*M. Dubin, Revere, Mass.*

Short Cuts and Tips

FROM PS READERS



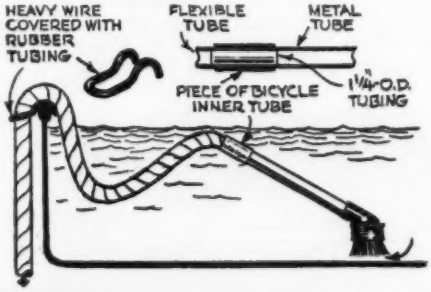


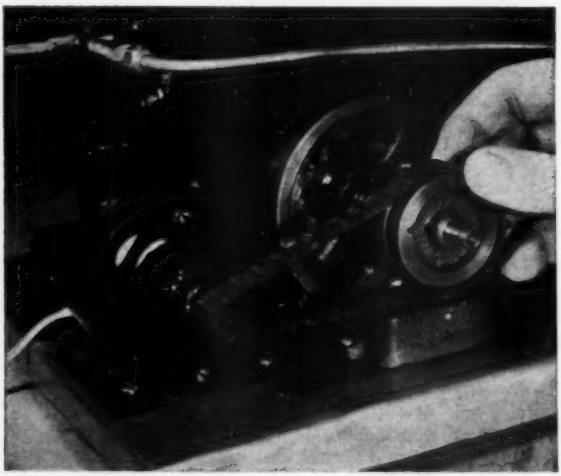
Quick Clamps for Table Saw's Removable Accessories

THE firm grip of a screen-door catch is put to good use on these table-saw accessories. A stop block (left) for gauging cutoffs can be snapped on the saw fence in a second. Two catches hold an auxiliary wood fence (right) in place for rabbeting or other special jobs.—*Edward R. Roberts, Whittier, Cal.*

Low-Cost Pool Cleaner

AN OLD vacuum-cleaner brush, with an assist from nature, makes short work of removing sediment from our above-ground plastic pool. I attached the brush handle to the hose that came with the pool for siphon draining. Running the brush along the pool bottom loosens the dirt, which is then flushed out with the water. A cleaning drops the pool level only an inch or so.—*Louis Eisen, Phoenix, Ariz.*





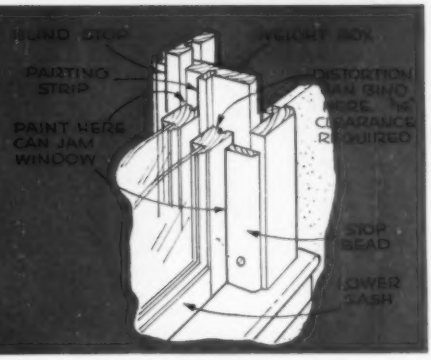
Toy Tread Runs Light Machines

EXPERIMENTAL drives, husky models, and light machinery such as aerating or cutting-oil pumps can be driven with the tread from a toy tractor.

Available in several sizes, the belts are strong enough to transmit respectable power without stretching, yet are so flexible they will run on very small pulleys. Properly aligned, they will stay centered on flat flywheels. A neat wrapping of friction tape on a shaft can serve as the small pulley.

Sticking Windows fix-it file

WHY WINDOWS STICK: Common causes are accumulated paint and dirt, warping, wet-weather expansion, and distortion from house settling or improper installation. Most frequently jammed window is type shown at right, which usually can be freed by cleaning and lubricating. Severe distortion may need planing. But plane with care in humid weather; drier days may shrink the sash, causing rattling and leakage.



Loosening a sash in place

IF SASH IS JAMMED IN CHANNEL, drive a screwdriver blade between it and the pulley stile to move the sash sideways and break it free. Tap putty-knife blade along stop to remove accumulated dirt or paint. If sash moves but stays tight, lubricate the channel. Half-and-half mixture of turpentine and melted paraffin makes a good lubricant.

How to remove sash

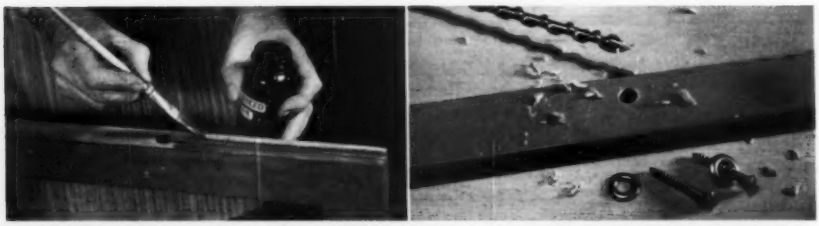
REMOVE STOP BEADS FIRST. If they're nailed, pull nails through back to preserve paint. Swing lower sash out, unhook cord or chain, and lower weight to bottom of box. Then pull out parting strips. These are usually simply set in their channels, but may be nailed or screwed in place. To remove casement sash, first disconnect its hardware.

CONTINUED

How to treat sash and guides

REMOVE CAKED PAINT AND DIRT from sash by scraping to bare wood or sound paint. Then sand it smooth. If sash has insufficient edge clearance (normal clearance is 1/16"), plane off some of the wood. Round any sharp corners with sandpaper. To widen channel in which upper sash moves, scrape or sand the normally exposed sides of the parting strip. Protect the size of the groove-fitting portion with a temporary guide.

How to prevent future sticking



BEFORE REPLACING SASH, brush linseed oil on unpainted surfaces. Let it penetrate, then remove excess. Oil improves smoothness, seals out moisture. Repaint any window member needing it; common cause of sticking sash is swelling resulting from paint failure. If stop beads were nailed, re-install them with 1¼" #8 oval-head screws and matching washers. Oversize (5/16") holes in bead permit shifting to adjust clearance.

What to do about sticking metal casements

TO FREE A SWINGING METAL WINDOW, unlock it and, while easing the operating mechanism, gently pry it open. Penetrating oil between stuck surfaces may help. Remove all interfering dirt, paint and corrosion, then recoat with paint that dries hard. Let it dry thoroughly before closing window. Distorted hinges or frame demand special tools and a professional serviceman. Clean and lubricate the mechanism for easy opening.

materials file

What You Should Know About Wood Putty

MASTER craftsmen used to turn up their noses at wood putty. Just a weak remedy for poor work, they called it. But this is no longer true. Everybody uses it.

Availability in colors has increased its usefulness. Now, a skillful wood patch compliments the craftsman, sometimes even more than a perfect job.

Part of the skill lies in selecting the right wood putty. There are many; every paint or hardware store stocks several. But the dozens of different brands can be sorted into a few types: ready-to-use, water-mixed, and glazier's putty.

Ready-to-use wood putty (Plastic Wood, Famowood, Softwood, etc.) comes in tubes and cans, and is probably handiest. It hardens quickly, and it's water-resistant.

When you use this wood putty, you're replacing lost wood by gluing more in its place. It consists of tiny particles of real wood—wood flour—mixed with cellulose cement. Its color is a shade of brown, and it has the familiar aroma of lacquer. The color gets lighter as the cement solvent evaporates and the putty hardens.

Unfortunately, solvent evaporates from the stuff left in the can, too. But hardened putty of this type can be revived with the manufacturer's solvent or acetone from the drug store.

Lacquer thinner will soften residue when cleaning up, but its use as a solvent changes the putty's properties. Sometimes this is desirable; lacquer thinner makes the putty dry dense and hard.

When dried, ready-to-use wood putty can be worked like wood. It will hold

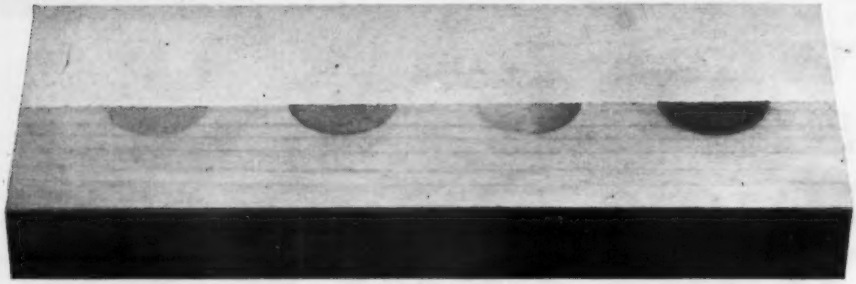
READY TO USE

WATER MIX

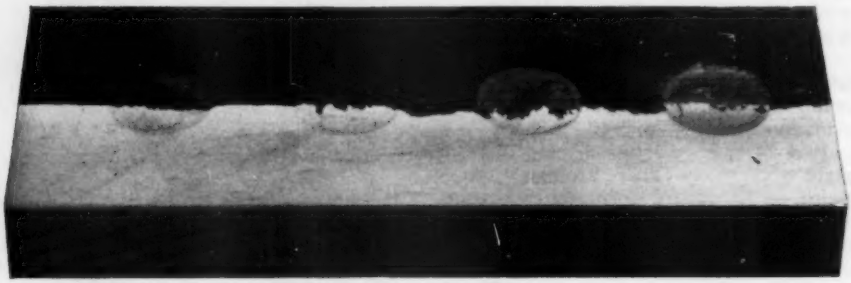
GLAZIER'S PUTTY

CONTINUED

What you can do with different kinds of wood putty



SIDE-BY-SIDE-COMPARISON shows how different putties take stain and paint. Representative putties were packed in shallow holes, allowed to dry 24 hours, then sanded and coated. The block above got two coats of paint, the one below a coat of unwiped alcohol stain. No attempt was made to match the colors to the stained white pine.



READY TO USE | SAWDUST AND LACQUER | WATER MIXED | GLAZIER'S

nails, tacks and screws. It takes paint well, but it's too dense for stain. For this reason, it's offered in several wood colors and shades.

Tubes or cans of this wood paste are handy for other repairs, too. You can use it to fill cracks in plaster, cement, metal, tile, porcelain, enamel, stone and glass. And you can make inlays, molds and plaques with it.

Sawdust and glue is a homemade version of ready-to-use putty. Sometimes it's superior; you can select your own wood flour and your own adhesive.

A teaspoonful of dust sanded from a scrap of the wood you want to match, plus a few drops of glue, makes a small batch. You can mix the concoction with a knife blade on an old can top.

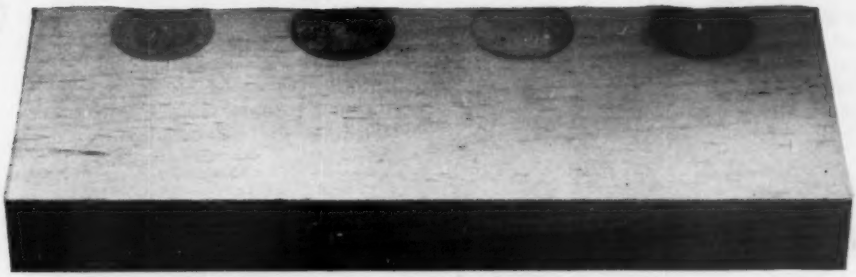
Using clear lacquer instead of glue makes a more natural-colored patch. For waterproof paste, use marine glue.

Water-mixed wood putty is a popular choice for big jobs—it's less expensive than the ready-to-use type.

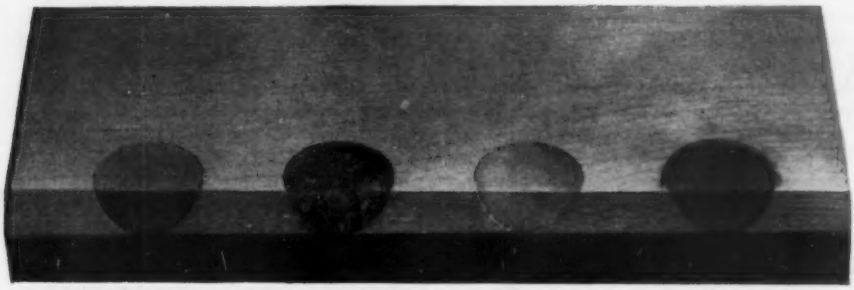
The base is a plaster-of-paris-type white powder, usually containing some wood flour. When mixed with water and allowed to dry, it fuses hard and dense. Sealed boxes or cans of the dry material keep well without deterioration.

Water-mixed putty can be planed, sawed and sanded, but different brands react differently to stain. Because of varying wood flour or mineral content, some are superabsorbent, others almost stainproof.

This kind of wood-replacer can be tinted by adding dry-earth colors to either powder or paste. It can be waterproofed



EFFECTS OF SANDING show up in test plugs above. Surface was sanded with block, edge rounded with hand-held paper. Most of the putties wore faster than the wood. Plugs below, all ¼" deep, were planed, also show effects of shrinkage. Sawdust-and-lacquer plug crumbled, its interior still soft. Glazier's-putty plug pulled away from edge of hole.



READY TO USE | SAWDUST AND LACQUER | WATER MIXED | GLAZIER'S

by mixing with varnish instead of water. For special jobs, mixing with milk will retard its setting time.

When you use water-mixed putty it's smart to moisten the wood first with a damp cloth, brush or sponge. This reduces premature drying.

Like ready-to-use wood putty, the water-mixed variety can do other jobs. You can use it to repair cracks in plaster and cement, level floors for linoleum or tile, or make inlays and castings.

Glazier's putty is still first choice with pros for filling holes and cracks in wood surfaces to be painted. It's economical, easy to work, and it stays workable a long time.

It's made of mineral clays—kaolin or calcium carbonates—mixed with linseed oil. But be sure to ask for, and get, glazier's *putty* when that's what you want. It's being replaced for glazing purposes by glazing *compound*. This is an elastic material that's better for holding glass, but not so good for plugging holes.

Glazier's putty keeps fairly well in cans. If it does harden, it can be revived by adding linseed oil. One big advantage is that it can be painted as soon as it's in place. Its principal drawback is high shrinkage—but this can be reduced by daubing the wood with linseed oil first.

Although colored pigments can be added, glazier's putty is not satisfactory for a transparent finish even when color-matched. It's too inclined to shrink and crumble if not protected by paint.

Putty sticks are relatives of the wood-putty family, but not close ones. These wax-base sticks were developed to con-

CONTINUED

ceal nails used in prefinished plywood.

They come in a large variety of colors —one panel maker offers nine shades of birch alone. Because of this color variety, they can be easily matched to almost any wood.

In use, the putty stick is merely rubbed across the nail hole or crack until the cavity is filled. The excess is wiped off with a cloth. This makes an easy way to plug small holes, the only use for this variety of putty.

Even this is limited to finished wood. The wax base rejects stains or paints.

When skill and effort pay off in an invisible patch, resist the temptation to be proud of it. After all, there's not much point in making a patch invisible, and then pointing it out.

Or is there?

Wood-Putty Tricks

BE SURE there's no air under a small wood-putty plug. The point of a knife blade, or a nail point ground flat, makes a ram for packing small holes. Hand-shaping a wad of filler into a long, pointed cylinder helps in filling small holes from the bottom up.

Fill deep spaces with successive thin layers. Let each one dry thoroughly. All wood putties shrink somewhat; thin layers minimize shrinkage, prevent warping in big patches.

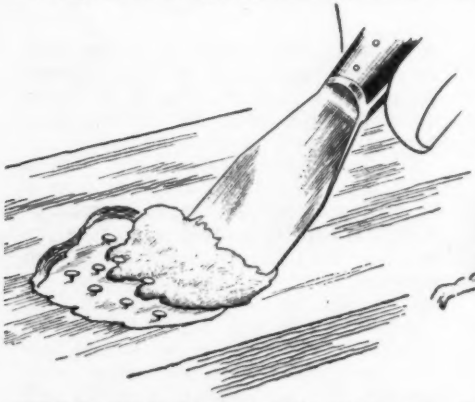
When you use wood putty to repair decayed or damaged wood, clean out the cavity first. Wood putty won't stick in a hole lined with dust or dirt.

Keep packing putty into a hole until it springs back, indicating an excess. Then when it's partially hardened, shave off the surplus with a putty knife or chisel. This will leave the surface high enough to counter shrinkage, yet save a lot of sanding.

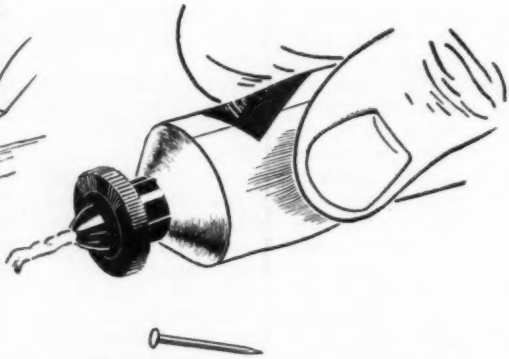
When sanding putty patches, use a firm block to keep the abrasive flat. Otherwise you'll get a mound or a hollow. Putty and wood don't have the same hardness; one wears faster than the other.

Use caution when filling holes in painted surfaces with ready-to-use putty. Solvent in its cellulose cement may soften surrounding paint.

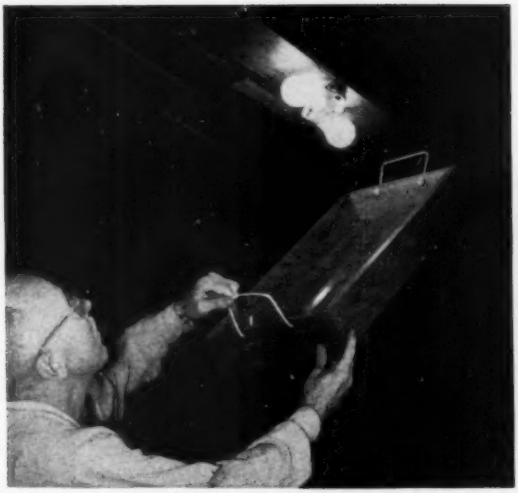
Experiment patiently when matching wood and putty under a transparent finish. The several shades of ready-to-use putty make the job easier, but far from foolproof. Experiment with different shades, using scrap wood and finish identical to the project's. Then use the same shade on the actual job.



UNDERCUT EDGES, STUDDING WITH NAILS, give putty a better grip in large cavities. Fill such holes with several thin layers for best results.

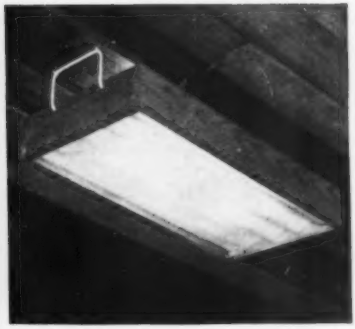


HOLE IN THE HEAD of pointed cap on putty tube makes hypodermic needle for filling nail holes. Use nail to plug hole when tube's not in use.



Short Cuts and Tips

FROM PS READERS

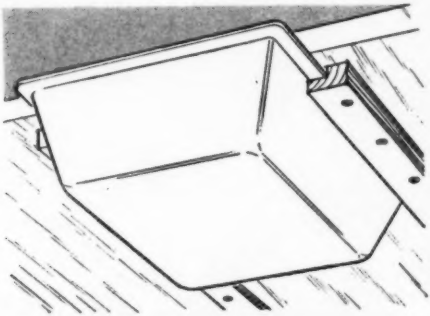


Easy-to-Build Diffuser for Your Overhead Lights

A SIMPLE box frame with a fiberglass bottom will turn a harsh overhead light into a soft, warm glow. Saw a kerf 1/8" deep, 1/4" from the edge of the 1"-by-4" sidepieces to fit the fiberglass sheet. If you use corrugated fiberglass and have no router to make a similar cut in the ends, butt them and hold with 1/4"-by-1/4" strips. Hang with clothesline and cup hooks.—*Paul Corey, Sonoma, Cal.*

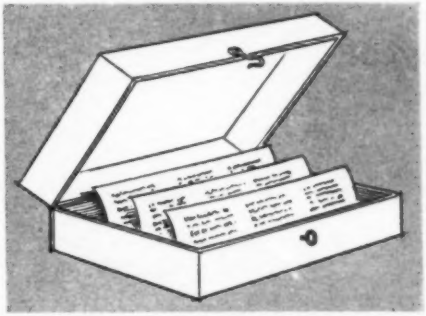
▶▶▶WHEN a tip comes off a shoelace, you can make a new one by wrapping a piece of cellulose tape around the end. This is especially useful for children's shoes.—*Lillian Koslover, Watertown, Mass.*

▶▶▶I FINISHED my level driveway with a dry mixture of cement and gravel, using a bag of cement to a ton of rock. It's not concrete but is a firm, solid roadway.—*Robert A. Brown, Shelbyville, Tenn.*



Making Workbench Drawers

IF YOU can salvage, from an old refrigerator, some of the bins designed for storing vegetables, you'll have handy catchall drawers for a work bench. The rounded corners make it easy to pick up small objects. Mount the metal drawers under the bench top on rabbeted cleats.—*Donald E. Henry, Oquawka, Ill.*



Deep Cigar-Box Container

Two cigar boxes and a little glue make a handy container for household odds and ends. Bottom is a box with lid removed; top is matching box turned upside down, hinged by gluing its abbreviated lid to the back of the bottom box. Add a hook and eye at front, paint or finish as desired.—*Arthur Moses, Springfield, Mass.*

Your invitation to outboard living

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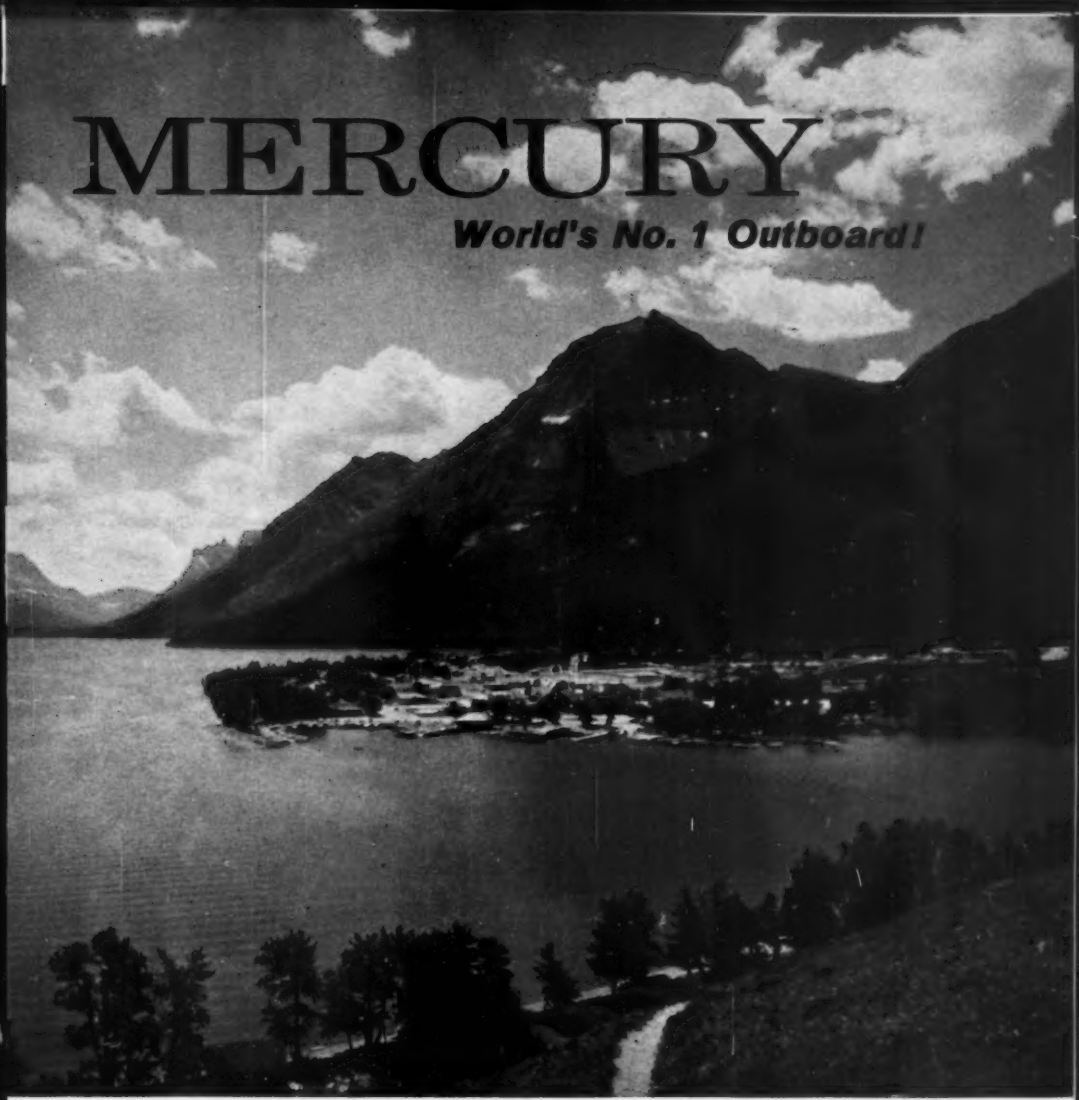
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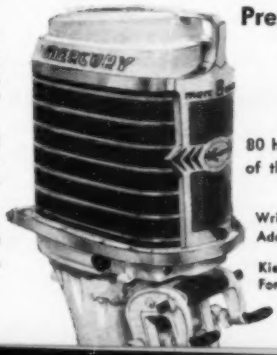

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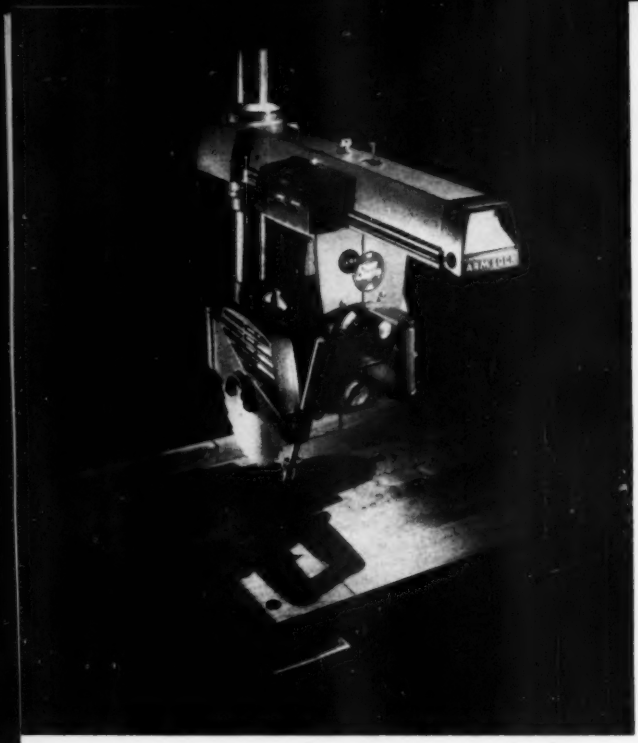


Regular readers of POPULAR SCIENCE *know R. J. De Cristoforo as the author of many well-grounded and informative articles dealing with home-workshop activities. For an outstanding example, see his "Thickness Sander for Home Shops" on page 164 of this issue.*

Some will also remember Cris as the author of "Power Tool Woodworking for Everyone," a best-seller that deals largely with the use of the Shopsmith. His long experience with this multipurpose tool made Cris a logical choice to shop-test the newest member of the "Smith" family, the Saw Smith, which goes on the market this month. —The Editors.

Shop-Use Report on the New Saw Smith

By R. J. De Cristoforo

"GIVE it the kind of rough treatment any display machine gets in a hardware store." Those were my instructions when the makers of Shopsmith shipped me a pilot model of their new radial-arm saw—the Saw Smith—for testing.

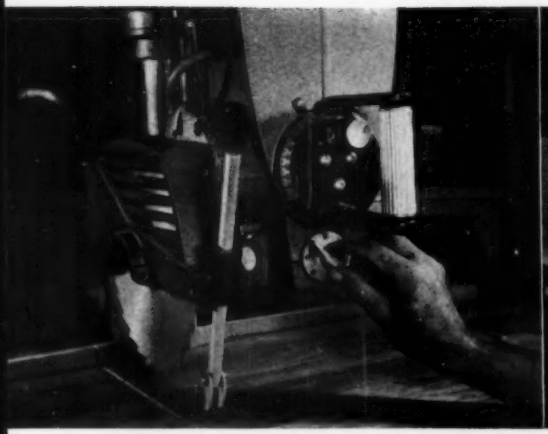
The tool was husky, handsome, modern. It had big, color-coded controls and locks that were smooth and positive in action.

I'd been told to look for unusual features. One was a mechanical key switch. I liked that, for I've experienced trouble with electrical key switches. Saw Smith's key simply activates a plunger that lets you punch *on* and *off* buttons. The former is recessed to prevent accidental starting, the latter raised so you can slap it down quickly in an emergency.

That was fine. But how long would the blade spin after the current was cut? I made a stop watch check. With the tool set for varying arbor speeds it took from

Quick Facts About the New Saw Smith

Price	$239
Table size	1" x 18" x 36"
Blade size	9"
Depth of cut	3"
Max. crosscut (1" stock)	20⅝"
Rips to center of	54" panel
Motor rating	1 hp.—develops 2
Column diameter	3"
Speed	1,700-6,300 r.p.m.
Spindles	2 (one threaded, one smooth w/tapered flat)
Max. blade above table	6½"
Indexes (on arm)	90-45-0-45-90
(motor swivel)	0-90-180-270
(motor tilt)	90-45-0-45-90



TURN A KNOB and you get a speed that suits the job—sawing, sanding, drilling, shaping, routing. You can set it way down to saw tough woods, or set it high for very smooth cuts.

TABLE SLIDES forward or back, to move the work exactly where you want it in relation to the tool. Adjusted for this rip cut, it offers maximum support right next to the saw blade.

BETWEEN STOP-CONTROLLED LIMITS, the table glides smoothly on nylon bearings. Once you've positioned it for the work, a pair of locking levers on the base hold it rigidly in place.

SAW CAN BE ADJUSTED and locked at the desired angle with one hand. Two fingers pull out the index plunger, and a slight twist of the handle locks or releases the assembly.

two to five seconds from the time you released the saw handle to strike the button until the blade came to a full stop.

Seven speed settings. I've just mentioned variable speed. This is an outstanding "first" in radial-arm saw design. To get it, the blade is not mounted on the motor shaft. Instead, there's a belt-connected saw spindle with an arbor at each end, set right below the motor. Split pulleys controlled by a cam vary the spindle speed. You turn the cam with a dial that offers seven click-stop settings ranging from 1,700 to 6,300 r.p.m. Working at 1,700, I had no trouble dicing a 6′ length of six-by-six with double passes—both rip and crosscut.

The independent, double-arbored spindle greatly increases the tool's usefulness. It allows a full 3″ depth of cut with the 9″ blade. Too, by switching from one arbor to the other you get equally good

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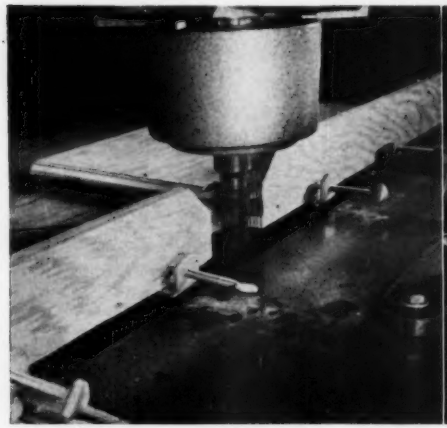
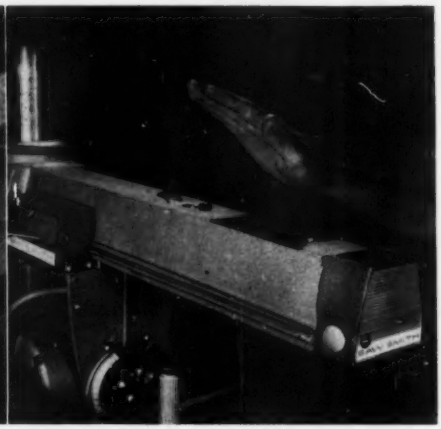
UNIQUE FEATURE is a right- as well as a left-hand arbor. Right-hand blade mounting offers more support for left-hand miter cuts as shown above. It also permits extra-wide ripping.

LOW SPEED, plus its sliding table, makes the Saw Smith a fine horizontal drilling machine. For such operation, the extra-high fence shown takes the place of the cutting guide.



FOUR LOCKING LUGS at the rear of the saw table let you apply two-piece fences and jigs. With double arbors you can rotate cutting tools either way, for feed from the left or the right.



KEY SWITCH controls on and off buttons, the latter projecting above the casting. A slap stops the machine within five seconds—with one hand coming from normal work position.

table support for right- and left-hand miter cuts. This isn't true of single-arbor radial-arm saws, which may not provide enough bearing area when used for left-hand miters.

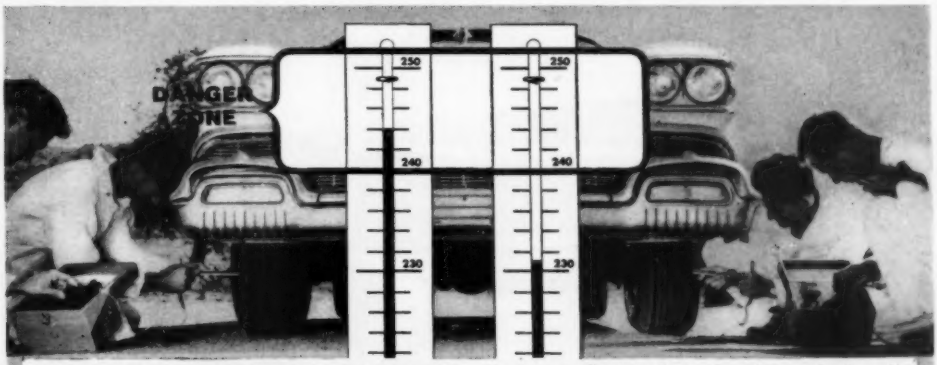
For work other than sawing, the right-hand arbor let me run any cutting tool in the conventional direction—and at the right speed, thanks to the speed changer. This meant that any tool I had in the shop designed to fit a standard 5/8" arbor could be used with this new Saw Smith.

On the fence. A feature that left me betwixt and between was the saw's sliding table. When making a maximum crosscut with other radial-arm jobs, here's the routine: First, in a fixed table you set the fence between segments that are far enough forward to let it steady the work just ahead of the blade. Then you draw the saw toward you as far as it will go,

[*Continued on page 246*]

Road Tests Prove: RADICALLY NEW SAFETY SHAPE LOW PROFILE TIRES

BEAT DEADLY TIRE HEAT



SEE HOW RAPIDLY ORDINARY TIRES GET HOT —WHILE LOW PROFILE TIRES RUN COOL!

Ordinary tire *(at left)* and new *Low Profile* tire *(at right)* get temperatures taken after running only 29 miles at turnpike speeds. Constant flexing has already pushed ordinary tire's temperature into the tire-destroying *heat danger zone.* But new *Low Profile Safety-Shape* tire is well *below* the danger zone. Even running hour after hour, U. S. Royal's *Low Profile* tire stays *cool!*

NEW LOWER, WIDER TIRES RUN COOLER, ARE SAFER, GIVE UP TO 35% MORE MILEAGE, SAVE GAS—YET COST NO MORE!

Why buy hot-running tires . . . when now, at down-to-earth prices, you can enjoy the extra safety of tires that beat deadly tire heat!

The above diagram shows *Low Profile* tires are *lower and wider* than ordinary tires. Built closer to actual working proportions on the road. So they don't flex as much. Don't strain as hard. *Run far cooler than ordinary tires!*

They're safer against tire failure at high speed. Safer on turns. Safer against skids. Safer in emergency stops.

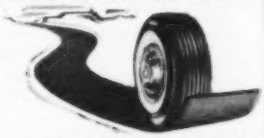
They give longer service. Roll easier—save gas.

U. S. Royal's new *Low Profile Safety-Shape* tire is now yours at popular prices, at your U. S. Royal Dealer's.

- **MILEAGE** 25% to 35% more mileage
- **HIGH SPEED ENDURANCE** 3 times better
- **TURNPIKE GAS ECONOMY** 6 to 12 extra miles per tankful
- **TURNING EFFORT** 20% more stability on curves
- **SKID RESISTANCE AND TRACTION**—raised 5 to 10%

U.S. ROYAL SAFETY 1 TIRES

Effective immediately in U. S. Royal Tires
A REVOLUTIONARY DISCOVERY IN RUBBER
NO-SHOCK RUBBER
GIVES YOU THE LUXURIOUS
RED CARPET RIDE



Smothers a million jolts a mile!

U. S. Royal's new super-supple rubber—born of new polymers, new processes, new production techniques—absorbs the "high-frequency" vibrations that cause driving fatigue. Gives you the "big-car" feel!

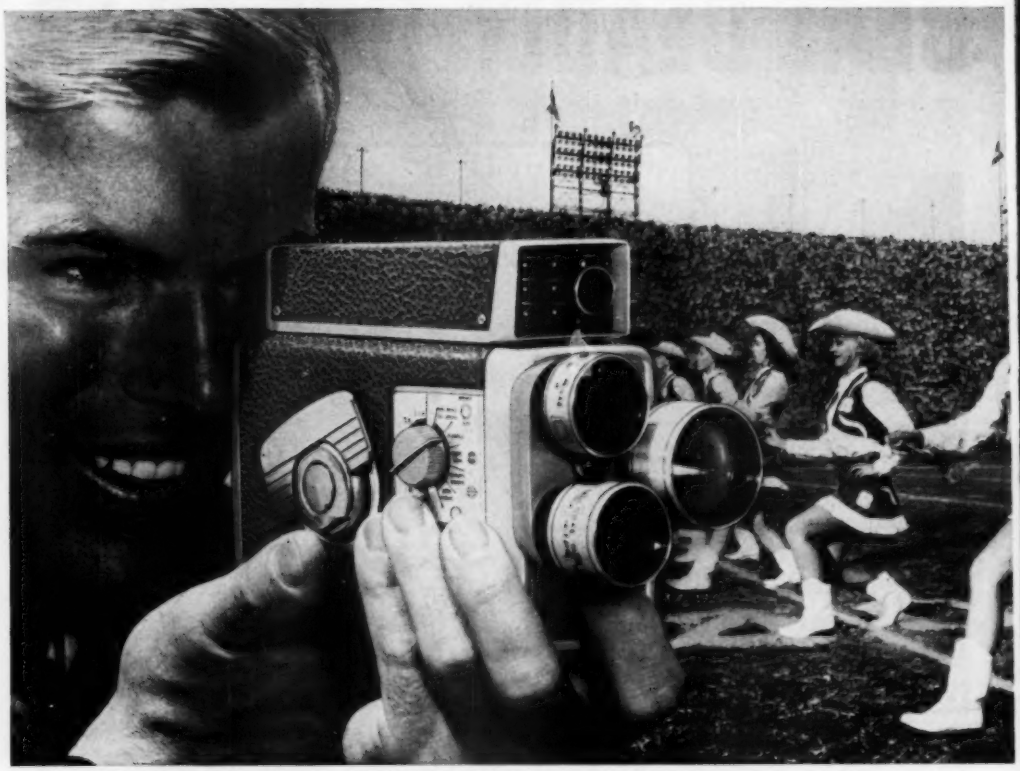
- No Bounce
- No Sing or Squeal
- Less Scuff
- Soaks Up Vibration
- Wears Longer

United States Rubber

Rockefeller Center, New York 20, N. Y. In Canada: Dominion Rubber Co., Ltd.

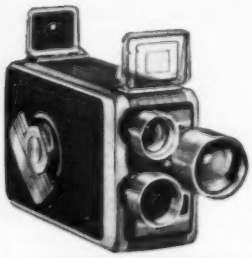
See things you never saw before. Visit U. S. Rubber's New Exhibit Hall, Rockefeller Center, New York

Now! Shoot perfectly exposed movies

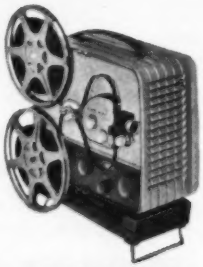


Get *all* the action, *all* the color . . . with the Kodak Cine Scopemeter Camera, Turret *f*/1.9. $99.50

Enjoy action-packed movies at a budget price—with 8mm Brownie Movie Equipment!



Brownie Movie Camera, Turret *f*/1.9. Three-lens range at a 1-lens price. Twist the turret for normal, wide-angle, or telephoto shots—and more exciting movies! Fast *f*/1.9 lens system gets bright, clear movies even on dull days. Only $67.50, or as little as $7 down.



Brownie 500 Movie Projector gives you brilliant 4-foot-wide screenings from a distance of only 16 feet. Accepts 400-foot reels for uninterrupted half-hour shows. Shows reverse action, "stills." Easy to load, easy to run. Only $79.50 or as little as $8 down.

...and show them automatically!

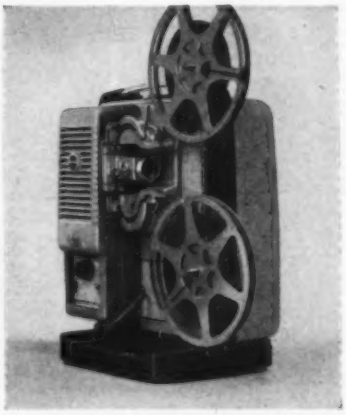
Kodak turret camera with built-in meter shows you when exposure setting is correct! New Kodak projector threads itself automatically . . . right onto the take-up reel!

Now you can make 8mm color movies and know they'll come out beautifully every time. Shoot in dazzling sunlight. In deep shadow. Even indoors. Yet you never have to guess at the right exposure setting. Here's how:

Aim the Kodak Cine Scopemeter Camera at your subject. Automatically, the built-in exposure meter measures the light. As the meter pointer moves, you see it move—right in your viewfinder. Just position the pointer by turning a knob and—presto—you've set the lens!

Move from sunlight to shade, and back again, changing your lens opening *while you shoot*. You never have to stop shooting to check exposure. For special effects such as sunsets you can set your lens independent of the meter reading.

And you can get three kinds of movie shots—normal, wide-angle, or telephoto—with just a flip of the turret. Other features include built-in Skylight and Type A filters . . . easy loading . . . fast $f/1.9$ lens system. All for only $99.50, or as little as $10 down at most dealers.



Show your movies automatically with the amazing new Kodak Cine Showtime Projector, Model A20. It threads itself from start to finish! Simply place your film leader at the top sprocket feed . . . the Showtime takes over from there. Threads right onto the take-up reel, starts your show automatically.

New high-lumen projection lamp provides brilliant screenings up to 5 feet wide. 400-foot reel capacity gives you uninterrupted half-hour shows. Price: only $137.50, or as little as $13.75 down at most dealers.

Ask your Kodak dealer to demonstrate this camera-projector team for you.

Prices are list and are subject to change without notice.

See Kodak's "The Ed Sullivan Show" and "The Adventures of Ozzie and Harriet"

EASTMAN KODAK COMPANY
Rochester 4, N. Y.

Kodak
TRADEMARK

What will the 1960 cars be like? One thing's certain: most makers of cars *and* trucks will use Champions!

Q. Why do 17 out of 21 U.S. truck manufacturers specify Champion spark plugs?

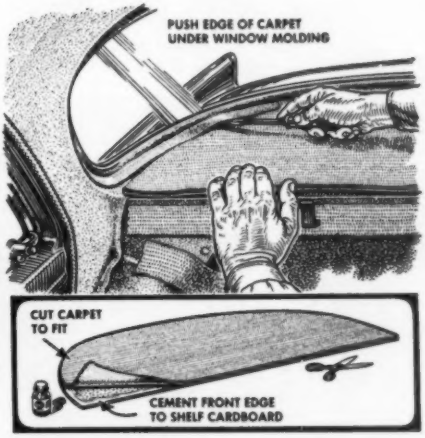
A. Because they know full-firing Champions are *dependable.* To get this dependable performance—plus extra mileage—in your car, put in new Champions every 10,000 miles.

World's favorite spark plug—engineered for every car built by Ford Motor Company, General Motors, Chrysler, American Motors, Studebaker-Packard and every major foreign maker.

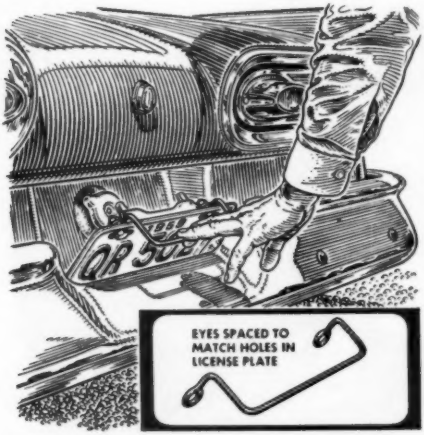
CHAMPION

Hints from the Model Garage

A lost license plate has a good chance of being returned if you've painted your name and address on the back. Most people will take the trouble to return a plate if they know where to locate the owner. You might also guarantee the postage.



You can silence the rattling of loose objects on the package shelf by fitting it with carpeting. Appearance will be improved, too. Cement the front edge of the carpeting to the shelf, and tuck the other edges under the rear-window molding.



A wire handle on the rear license-plate bracket will end the annoying slamming each time you buy gas. It'll save the rubber bumpers, too, as slamming often causes them to drop off. Bend the handle from heavy wire or a length of brazing rod.

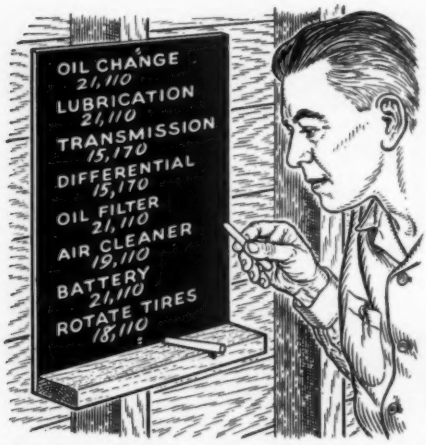
Feed a thirsty battery the exact amount of water it needs without splashing by using a plastic nursing bottle. The rubber nipple can be used by snipping off its tip, or a tire valve can be trimmed to fit, and stoppered with a valve cap as shown.

CONTINUED

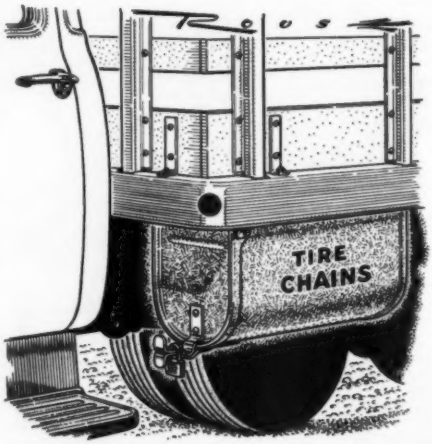
More Hints from the Model Garage

This emergency bucket can be folded flat to take less space than a road map in the glove compartment. It's a plastic vegetable bag. With it, you can carry several quarts of water to a boiling radiator that has forced you to stop at the roadside.

Sponge-rubber cushion material—the type used under home carpeting—makes good insulation for your car. Spot-cemented under floor mats and rear seat, it keeps out road noises and cold. It's clean, easy to cut, and won't fall apart when wet.



Keep car maintenance regular—especially if you do it yourself—with a chart on the garage wall. Cover a piece of 1/4" plywood with blackboard paint and add a narrow shelf. Letter service operations on the board and record mileages with chalk.



A rural-type mailbox bolted upside down beneath a truck body makes a quickly accessible storage locker for tire chains. Another box on the opposite side can store tools for roadside repairs and emergency flares. A padlock will prevent theft.

NEW BT3 ENDS TUNE-UP GUESSWORK!

NEW TUNE-UP CONCEPT BALANCES CARBURETION, COMPRESSION AND IGNITION TO RESTORE *NEW CAR POWER!*

Maintain the new car power, performance and economy that was designed into your GM car. Get a BT-3 tune-up . . . the *balanced* tune-up, three ways.

With this new concept, your compression, ignition and carburetion are checked, adjusted and restored to new car condition. Every replacement part is factory approved. For example, all carburetor parts are genuine parts for Rochester-GM Carburetors . . . original equipment on more new cars than any other carburetor. And the whole step-by-step, scientific procedure of BT-3 is factory recommended.

Stop wherever you see the BT-3 sign, and enjoy the new car performance that only a balanced tune-up can give. Or if qualified service is your business, contact your nearby UMS distributor to learn how to give BT-3 to your customers.

GM
GENERAL MOTORS

America's number one original equipment carburetors

ROCHESTER CARBURETORS

ROCHESTER PRODUCTS DIVISION OF GENERAL MOTORS, ROCHESTER, NEW YORK

Gus Fixes a Race

"Tooling against these local plow jockeys," said the driver, "is like taking candy from kids."

By Martin Bunn

THE coupe that pulled up in front of the Model Garage was a beat-up, prewar model, painted a lemon yellow. Two T-shirt-clad youngsters unstrapped the doors, swung them open on loudly protesting hinges, and climbed out.

"Junk yard's out on the edge of town, boys," Gus Wilson greeted them.

"Man, he doesn't know," said Cliff Johnston, his face one big smile.

"That's right," agreed his lanky partner, Jim Gerber. "This mechanical marvel, Mr. Wilson, has a destiny."

The two youngsters looked lovingly at their pride and joy. Cliff sighed. "Isn't she a beaut, Gus?"

The Model Garage proprietor circled the vintage vehicle. The fenders had been trimmed off, the headlights removed, and a strongly bracketed steel-tube arch extended up under the roof.

"What is it?" he asked.

"Quit kidding," said the lanky one. "That's about the keenest stock car you've ever laid eyes on."

"Only one thing missing," put in Cliff. "We need a sponsor. Can't you just see it, Gus?—'The Model Garage Special' painted in big black letters."

"Now, wait, fellows . . ."

CONTINUED

Big Reason Why AC Spark Plugs Must Be the Best!

AC-Pioneered Insulator

They must be the best! New

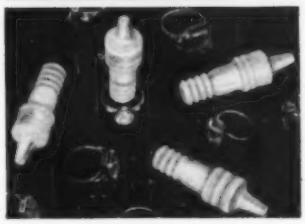
Now Available at 302,000 Service Stations, Garages, Car Dealers, Farm Implement Dealers and Marinas

Leads Field in Quality!

ALUMINUM OXIDE—WHAT IT IS. The fine, white powder shown opposite is aluminum oxide. It is the basic material of the ruby, emerald and sapphire. It is made artificially from bauxite, the raw material of aluminum, and it is from this material that AC forms its spark plug insulators of gem-like hardness. AC pioneered and perfected the idea of aluminum oxide for spark plug insulators and uses it by the carload for the millions of AC Spark Plugs made for original equipment and replacement. Each carload is laboratory tested to rigid standards of quality and reliability.

SECRET FORMULA MAKES THE DIFFERENCE. AC ceramic specialists experimented with scores of formulae before they settled on the one considered ideal. From it came an insulator able to take higher stresses, and with longer life, greater resistance to breakage and better insulating characteristics than any previous material.

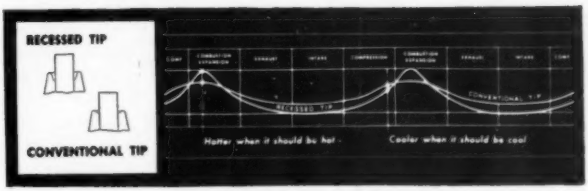
TESTING TO INSURE HIGHEST QUALITY. In the Kodak shadowgraph, at high magnification, insulators are given a highly accurate dimensional check. Further, samples of finished insulators are tested to withstand a 600 pound tensile pull that is well beyond the strength of other makes. There are weight tests, density checks and thermal expansion and conductivity tests. In total, some 116 reliability tests are given to AC Spark Plugs.



JEWELS IN EVERY SENSE. The ruby, emerald and sapphire are nature-processed aluminum oxide. AC Spark Plug insulators are man-processed aluminum oxide. In the gems, a trace of impurity lends color. AC insulators are pure white and have no crystalline fracture pattern. They are truly gems—but yours at a price far less than a gem, and no more than that of ordinary spark plugs.

AC SPARK PLUG ⊛ THE ELECTRONICS DIVISION OF GENERAL MOTORS

Pictures at right show how AC's exclusive Hot Tip is deeply recessed to clear the centerwire while ordinary tip hugs the centerwire. Graph shows the Hot Tip's faster-heating, faster-cooling action. Fast heating prevents fouling. Fast cooling prevents pre-ignition.



AC Fire-Ring Spark Plugs

AC PRESENTS THE ART CARNEY SHOW, NBC-TV, NOVEMBER 13

...with less oil and gas!

Don't put up with poor performance and big oil and gas bills just because your car's no longer new. You can restore its lost pep and power and prevent excessive oil and gas consumption, with a Hastings re-ring job.

The sooner you act, the less it will cost. See your motor specialist the minute oil-pumping warns you there's trouble ahead. When he recommends new piston rings ask him for Hastings. They're engineered exclusively for replacement service . . . to provide the additional lubrication worn engines need . . . to stop oil-pumping, save gasoline, restore lost performance.

Get new car power and performance from your present car—with Hastings. Truly your best investment for many thousands of extra miles of trouble-free driving pleasure.

HASTINGS

PISTON RINGS

TOUGH on oil pumping GENTLE on cylinder walls

HASTINGS MANUFACTURING COMPANY
HASTINGS, MICHIGAN

Piston Rings, Casite, Oil Filters, Spark Plugs

"Yes, sir," broke in Jim, not giving Gus a chance. "And in exchange for this fabulous advertising all we want is your technical assistance a week from Saturday at the County Fair stock-car race."

Gus held up one hand like a traffic cop. "What you two fast-talkers don't know," he said, "is that this year I'm heading up the technical-inspection committee for the race."

"What's this technical committee?"

Gus explained that the Fair Board was increasing the purses. With bigger prizes, unscrupulous entrants might be tempted to sneak extra, illegal horsepower into their engines. "And," he concluded, "as a race official, I can't sponsor an entry."

They nodded. Cliff spoke: "Well, Jim, guess we'll have to take up that offer of the Jones Fruit Market to sponsor us."

Gus saw how disappointed his visitors were. "Tell you what," he said. "Drive around a couple of nights before the race and I'll tune up that heap for you."

ON THE day of the race, Gus watched the trials from the timer's stand, checking now and then on the times being turned in by the stock cars as they roared around the dirt oval. With him were Stan Hicks, his assistant, and portly Joe Green, the Fair Board representative on the technical committee.

"Looks like Johnston and his yellow menace may barely qualify," Gus said.

"Got my fingers crossed," Stan said. "But watch Car 14. Bet he'll turn in a time 10 seconds faster than the others."

"Been keeping my eye on him, Stan." Gus turned to Joe Green. "Is 14 local?"

Green checked a list. "Nope," he said. "Fellow named Hawkins, from upstate."

"He's pretty hot," Stan prodded.

"That's what I'm thinking," Gus agreed. "That car 14 is due for some special attention during pit inspection."

In the pits, Gus went over the cars. Peering intently at one engine, he wiped a finger across the carburetor body. Then he moved back, removed the gas cap, and bent over, sniffing.

"What's he looking for, Stan?" asked a puzzled Joe Green.

"Souped-up fuel—alcohol, ether. Usually you can smell it."

Gus gave an okay sign with his thumb and forefinger and headed down the line. Most of the drivers he knew. At car 14

Gus introduced himself to the driver.

"Name's Wilson," he said. "Technical committee. Congratulations on turning in the fastest trial time on our track, Mr. Hawkins."

"Duck soup," said the driver, chewing on the stub of a dead cigar. "Tooling against these local plow jockeys is like taking candy from kids."

Gus ignored the crack. "You understand we're strictly stock here?"

Hawkins nodded. "Strictly stock. Look her over, Mr. Wilson."

"Let me hear what she sounds like."

Hawkins shrugged, slid behind the wheel. The engine roared to life.

"Now let's drain the water and pull one of the heads," Gus said.

Hawkins jumped out of the car, fighting mad. "Look, Mister, I got an honest mill here."

Gus felt a tug at his sleeve. "Better be sure, Gus," Joe Green said timidly. "The Board doesn't want any trouble."

"Yeah!" Hawkins glowered. "You ready to post the $50 challenge money?"

"That's the rule here," Gus said calmly. "Tear it down."

When Hawkins and his mechanic had drained the radiator and removed the head bolts, Gus went to work. He looked into the valve ports for signs of enlargement or polishing. A measurement of valve lift ruled out the high lift of a special camshaft. There was no indication of excessively milled heads.

Gus straightened up and turned to Stan. "How about getting my inside micrometers? I want to measure bore size to check for a stroked crank."

"Here, use mine," said Hawkins, taking a set of mikes from his toolbox.

As Gus selected the proper mike stem and slipped it into the thimble, Joe Green edged near Stan. "What's he after now?"

"A special crankshaft," Stan told him, "that lets the pistons make a longer stroke. Increases displacement—and horsepower."

"Looks okay," Gus said.

There was a look of smug satisfaction on the driver's face. "Just be sure you have that $50 challenge money ready for me when I've won the race."

DOWN the line Cliff Johnston and Jim Gerber were working frantically,

CONTINUED

Your dipstick PROVES the difference in filters

Hastings Oil Filter Cartridges keep oil clean from filter change to filter change, when replaced as normally recommended.*

That's because only Hastings has Densite filtering material, which traps and holds even the most microscopic dirt particles. The dipstick test proves it!

Just ask for Hastings—next filter change. Be sure of clean oil *all* the time.

*Proved by tests conducted in accordance with U. S. Bureau of Standards.

U. S. Patent Numbers 2,797,811 2,584,771

HASTINGS OIL FILTER CARTRIDGES

HASTINGS MANUFACTURING COMPANY
HASTINGS, MICHIGAN

Oil Filters, Casite, Piston Rings, Spark Plugs

tools spread out around their yellow jalopy. They looked up hopefully.

"Stan, check the fuel tank," Gus said, "while I take a look at the engine."

"Gee, thanks," Cliff said. "Maybe you can find out why it almost dies when I tromp it hard coming out of the turns."

"Aren't you two forgetting that I'm an inspector today, not a mechanic?" Gus said as he went over the engine. He paused, took a close look. "Sorry, boys, you'll have to remove this fuel filter. It's not stock for this engine."

"Oh, no," protested Gerber.

"Oh, yes," Gus said. "Either put on a stock filter or pipe it up without a filter."

"We've gotcha this time, Googan!"

GUS was relaxed in a chair in the timer's stand, puffing on his pipe, when Stan climbed up, balancing two cardboard trays. "Here, boss," he said. "Thought you'd like a snack before the feature starts—soda pop and 'foot-long' hot dogs."

"If that thing is a foot long, I'll . . ." Gus jumped up. "That's it, why didn't I . . ." The rest of his words were drowned out by the crescendo roar of engines as the pack accelerated to the sweep of the starter's flag.

When the noise had subsided, Gus waved the frankfurter in his assistant's face. "That Hawkins engine is no more stock than this wiener is a foot long."

Stan's face was a blank.

"Think, Stan," Gus went on. "I used his mikes to measure the engine bore. How big a sucker can you be?" He headed for the announcer, whose voice was blaring from the loudspeakers:

"It's Hawkins in car 14, way out in front . . . Looks like he may add this feature to his string of victories here today . . . Wait, here's a word from our technical committee . . . Car 14 will be impounded at the completion of the race."

SECONDS after the race had ended, a furious Hawkins appeared at the timer's stand. "Now what's the beef, Wilson?" he stormed, yanking off helmet and goggles. "I won that race fair and square."

"Not for my money," Gus said calmly.

"Well, I'm not tearing my engine down again for you or anyone else."

"You won't have to, Hawkins. Just let me see that micrometer stem of yours. The one that reads maybe—oh, about an eighth-inch under actual size."

"So you finally caught on to that trick."

Joe Green gave the driver a reproving look. "You admit cheating?"

Hawkins gave a laugh. "Sure. And I almost got away with an oversize bore."

AS THE disqualified winner drove away, Cliff and Jim stepped up.

"And that puts us third," Cliff said, "and in the prize money. But we're still sore at the way you treated us at pit inspection."

"Yeah," Gerber chimed in. "We had some time cobbling up the fuel line."

Gus chuckled. "I figured that might bring you boys into the money."

The two looked at him dumbly. Then Cliff gulped, "How's that?"

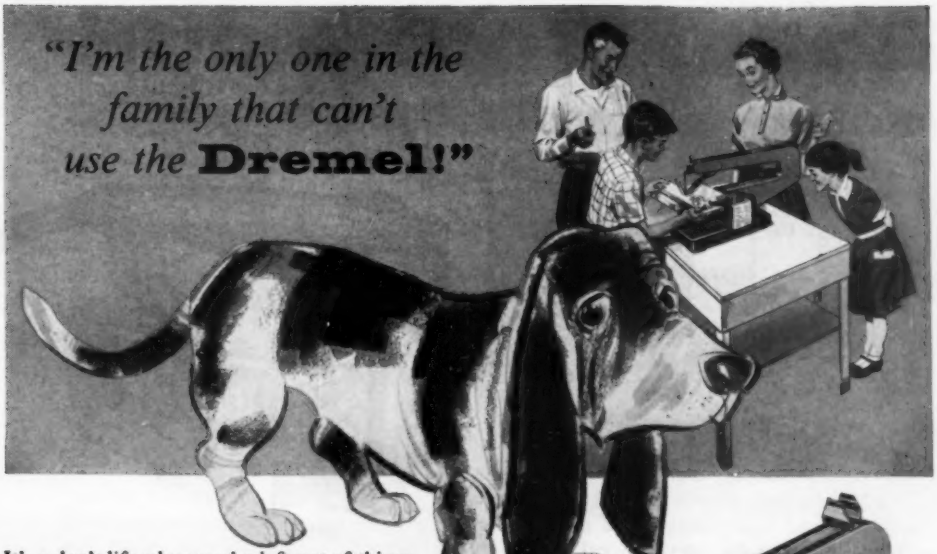
Gus explained that paper-element fuel filters should be changed often, or they might let small amounts of water seep through, swell, and restrict gas flow.

"And that," he said, "seemed to be the only thing that could be causing the trouble you described. Remember, I overhauled your car only a few nights ago?"

Gerber nodded.

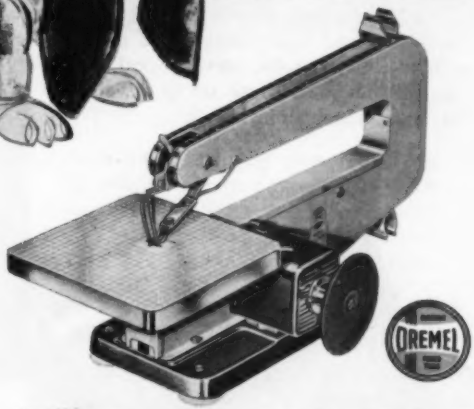
"And just because you billed that yellow monstrosity as 'Jones Fruit Salad,' I couldn't let you drive a lemon."

Next Month: Gus pulls a switch.



It's a dog's life when you're left out of things — but not so with a Dremel Moto-Shop. Here's an exciting way the whole family can enjoy a woodworking hobby together. Teaches children to be creative and helps cut down the TV habit.

Not a cumbersome cast iron model, but sturdy, lightweight, portable — and safe. Unique blade guard protects even the littlest hands. Simple operation — make gifts, toys, furniture, practical items for the home.



Treat your whole family to a Dremel Moto-Shop. America's most popular and useful multi-purpose tool.

- **Large capacity** — Has 15" throat — cuts 1¾" wood, light metal, tile, plastics.
- **Powerful ball bearing motor** — not a vibrator. 3,450 strokes per minute.
- **4-way blade holder** — saws in any direction.
- **Lightweight,** sturdy — easy to carry or store away.
- **Tilting table** — Tilts 45° for angle and bevel cuts.
- **Adjustable table** — Raises or lowers to new blade area.
- **Economical** — Self contained — no extra motor — no belts or pulleys.

A complete power workshop in 1 compact portable unit. Two models to meet any family's need.

Model 571 Moto-Shop. Includes 15" Jig Saw with disc sander attachment only as shown above . . **$33.95**

Model 572 Deluxe Moto-Shop. Includes 15" Jig Saw with disc sander, grinding wheel and guard, wire and cloth buffing wheels, a 12 piece accessory set, and 30" flexible shaft (grinds, drills, carves, polishes, engraves, sands, sharpens) **$49.95**

Ask your Power Tool Dealer for a Demonstration

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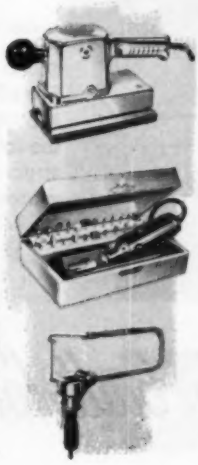
DREMEL MFG. CO. **Dept. 129-K Racine, Wis.**

QUALITY POWER TOOLS SINCE 1934



DREMEL POWER SANDERS — All Dremel Sanders have it — *Straight-Line Action!* Means you sand with-the-grain, get the smoothest finish. No swirl marks, no scratches. Three models — from **$14.85** to **$37.50.**

DREMEL MOTO-TOOL KITS — A compact, pocket-size machine shop. Grinds, polishes, carves, sharpens, drills, engraves. For fine detail work at home or shop. Speed range from 25,000-27,000 rpm. Prices, **$14.85** to **$27.50.**

DREMEL MOTO-SAW — The scroll saw everyone can use skillfully. Cuts the most intricate designs accurately at 7200 strokes per minute. Saws ¾" wood, light metal, plastics, floor and wall tile. **Model 203 . . . $6.85.**

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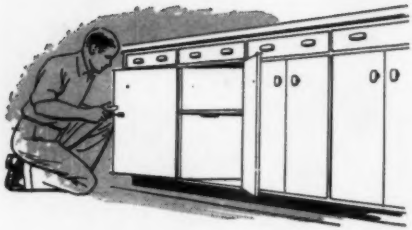
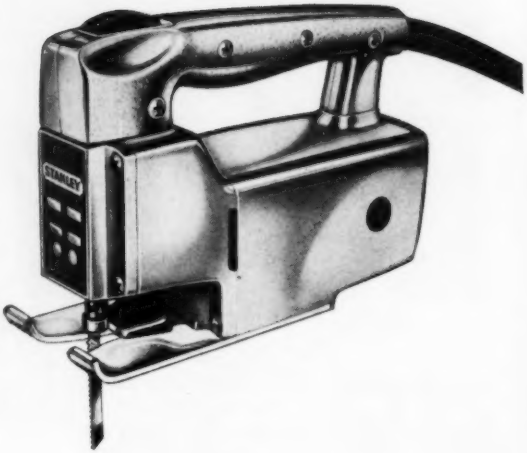
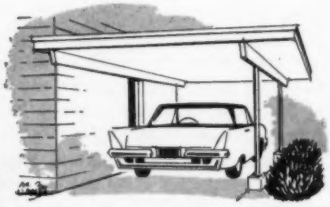
with these terrific



MODEL H75

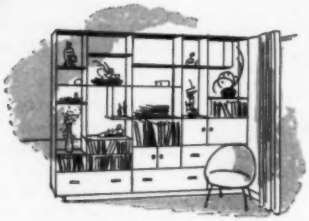


Heavy-duty sabre saw—only $44.50, plus 7 blades worth $4.90—FREE!
Lowest-priced heavy-duty sabre saw you can buy. Cuts scrolls, curves, wood, metal. Special blades cut flush up to a wall and to 5/8 of an inch along a wall.



MODEL H131

$6.00 off on 3-amp ¼" drill. Reg. $24.95
Stanley special fall price—$18.95
Most powerful ¼" drill for the price on the market. *Plus* rugged bearing construction, non-slip pistol grip, 3-jawed geared chuck, 3-wire cord.



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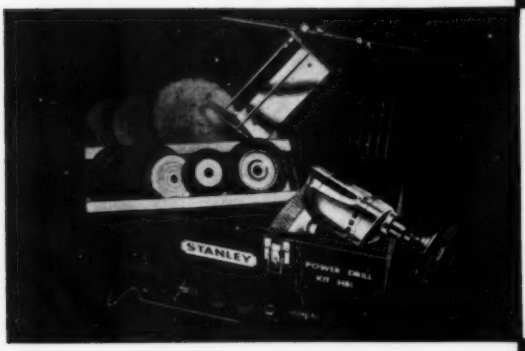
MODEL H36

Heavy-duty orbital sander — $49.95
Get 2 permanent abrasives . . . FREE!
You save $4.00 and lots of work, too. Powerful, rugged, the H36 gives satin-smooth finishes, fast!



MODEL H81

Save $4.30 on new power drill kit. A $43.25 value, now only $38.95.
Complete with 3-amp ¼″ drill, steel case, and 19 extras, including famous SWIRLAWAY sander/polisher.

MODEL H288K

$15.00 off on complete builders saw kit. $67.95 value . . . now — $52.95
Powerful 6½″ saw has rear controls, Free-start guard, ball-bearings. And you get case, etc.—*free!*

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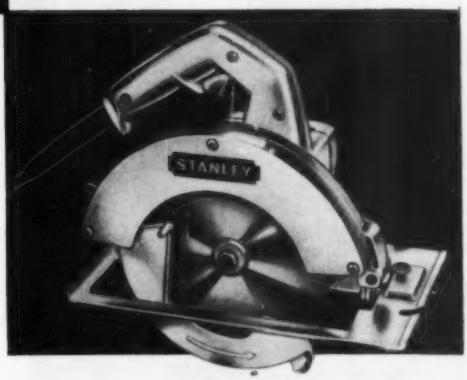

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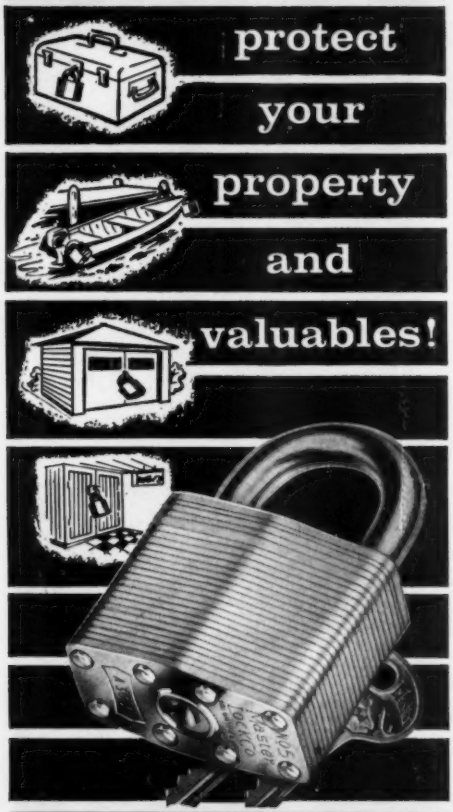

$1.25 to $4.00, in a variety of sizes, at locksmiths and hardware stores everywhere

Master Lock Company.
MILWAUKEE 45, WISCONSIN
World's Largest Padlock Manufacturers

Fast-Draw Fad Brings Boom to Handguns
[*Continued from page 138*]

people shooting each other, but of people shooting themselves with guns that never left their own holsters.

For this reason, most gunslingers use blank cartridges or wax bullets, and race electrical timers. One timer, sensitive to sound, starts when the gun hand releases a button and stops when the gun fires. It measures, in hundredths of a second, the speed of the draw, but not its accuracy. Other types record elapsed time only if a wax bullet strikes a target, measuring both speed and accuracy.

The high cost of timers—about $150—has confined them to organized clubs. But the fast draw may soon become a living-room pastime. Crosman plans a low-cost timer that will record either the impact of bullets on a target or—for home use—simply the sound of an unloaded gas pistol or kid's capgun.

Amusement or menace? Modern gunslingers, despite their numbers, are waging an uphill battle for acceptance. Many hunters and target shooters look down on the leatherslapping slicksters in much the same way as sports-car enthusiasts did the early hot-rodders.

Exactly how many faddists foolishly mow each other down in the name of fun is not yet known because the sport is so new. The critics cite the 14,000-odd deaths a year caused by guns of all types, sometimes neglecting to point out that 4,000 of these are homicides and 8,000 are suicides. Of the remaining 2,000, a third to half are hunting accidents that can't be blamed on handguns.

Even such powerful pro-gun lobbies as the National Rifle Association were quick to see how a few crackpots and showoffs could spoil the fun for everyone. In a recent editorial, the *American Rifleman,* official NRA publication, cited a dozen tragic accidents and stressed the need for safe gun handling.

Meanwhile, gun makers, weary of hearing only horror stories about their products, enjoy an occasional laugh. Seems a bad fire in the Ozark Mountains drove thousands of snakes into populated towns. "You should have seen those orders pour in," says a High Standard official. "I guess the sixguns did the job because we're still getting letters about how there aren't any more snakes in the Ozarks."

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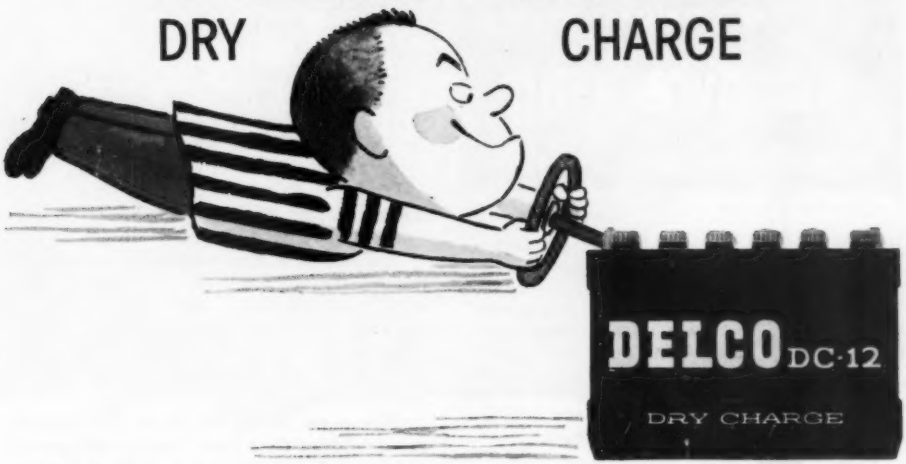
START WITH DELCO DC-12

DRY CHARGE



In a mere ten years the electrical requirements of automobiles have tripled! And the only batteries that can meet this increased demand for power are those which are specifically designed for the job. The Delco DC-12 is!

It's a hard-working dry charge battery built to handle the extra demands of high compression engines and power equipment. Moreover, it's the only battery designed and manufactured by an automobile producer. These are important reasons why, when you replace, you should ask for a Delco DC-12—the 100% fresh battery that is factory installed on almost half of the new cars built.

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Versamate . . . a wonderful tool that fits any power drill —reduces speed to give seven times more power. Drives screws of all sizes. Inexpensive extras make it a nut and bolt driver, heavy-duty drilling unit. See your tool dealer today!

$9.95

ONE OF THESE FINE TOOLS
WILL TAKE THE **WORK** OUT OF
woodworking
Ask the "pro"...your tool or lumber dealer

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Versamatic triples portable drill usefulness. *Reverses!* Drives *and removes* screws, nuts, bolts. Boosts power 7 times. Set includes regular and Phillips-type bits, and ¼" square drive adapter. For heaviest drilling jobs in steel and concrete, add a ½" Supreme Brand Chuck.

SUPREME
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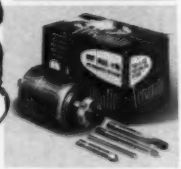

SUPREME PRODUCTS CORPORATION
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Firemen Burn a School to Save Lives

[Continued from page 89]

third floor to a still-sizzling 245 degrees.

Smoke from an unrestricted fire in a second-floor classroom—simulating a laboratory blaze, for instance—was worst in the floor above. Firemen were routed from the third floor in 4½ to six minutes; from the second floor in 4½ to 10½ minutes. On both floors, heat became intolerable in seven to 10 minutes.

The answer: water. Of all the protective measures tested, only water—applied directly and immediately to the blaze—kept the smoke and heat from reaching dangerous levels everywhere in the building. That means only a complete, automatic sprinkler system can insure safety.

Other methods failed.

A partial sprinkler system held the heat down, but had no effect on smoke.

Automatic vents over stairways—an idea often proposed—proved to be of little help. The vents slowed the spread of smoke slightly but made the heat spread faster.

Complete enclosure of vented stairwells, another promising safety device, was rejected by the Los Angeles firemen. The doors might be left open, destroying the chimney effect of the stairwell.

Draft curtains in the corridors kept down heat on the side opposite the fire, but only slightly hindered smoke.

The tests demonstrated that acoustical tile, so widely used in schoolhouse ceilings, spreads fire very rapidly once ignited. However, the tile did not ignite until *after* the rooms beneath it were already too full of smoke and too hot for anyone to survive there.

Money vs. lives. While the fire experts are confident they know how to safeguard old schools, they must still convince officials. Complete sprinkler systems are expensive: $10,000 or $12,000 for the average building.

But Los Angeles Battalion Chief John G. Degenkolb is quick to point to the case of San Francisco's Jefferson School. Last May fire gutted this 39-year-old building.

"It will cost San Francisco a million dollars to rebuild that school," Degenkolb says. "For that money, they could have put an adequate sprinkler system in every school in the city!"

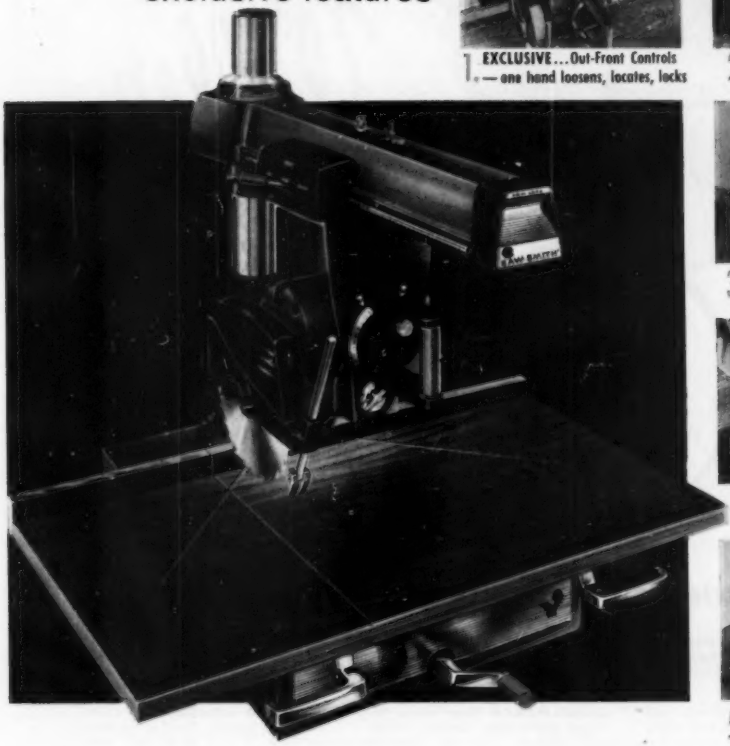
TRULY NEW...ALL NEW...from YUBA

SAWSMITH Radial Arm Saw

with the

BIG 5

exclusive features



1. EXCLUSIVE...Out-Front Controls — one hand loosens, locates, locks

2. EXCLUSIVE...Vari-Speed Drive — 7 speeds, not just one

3. EXCLUSIVE...Switch-Over Blade — puts all cuts fully on table

4. EXCLUSIVE...one-piece Sliding Table — no fence-fumbling

5. EXCLUSIVE...Coil Cord — safely and always out-of-the-way

Now . . . do it *yourself*—do it better—on a SAWSMITH. It's the newest radial arm saw . . . *does* so much more but costs *no more*. The exclusive Big 5 features put new ease into every phase of woodworking. SAWSMITH makes home craftsmanship so simple you do a professional job the *very first time!*

You just decide and guide. SAWSMITH furnishes skill and precision for *fourteen* basic operations, does hundreds of jobs . . . enables you to convert instantly from one operation to the next. It's the *only* saw with the right speed for every power sawing job—from softest pine to toughest oak.

Whether you're a hobby-man or handyman, you'll find SAWSMITH a revelation in time and money-saving . . . a responsive tool for creative man-type talent.

See it at your dealer or Montgomery Ward store. For literature on SAWSMITH's exclusive BIG 5 features and 25 extra values, write Dept. RPS-10.

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SOLDERING GUN KIT

Features the new Weller Dual Heat Gun—most advanced soldering tool on the market. Not only does the heat and spotlight come on instantly when trigger is pulled, but 2 trigger positions give 2 soldering temperatures. You can switch instantly to high or low heat as your job requires.

Kit also includes cleaning brush, soldering aid and solder

$7.95 MODEL 8200K

Don't settle for less than these Weller Gun Features

DUAL HEAT Saves time, adds convenience and increases tip life. You use high heat only when necessary.

INSTANT HEAT Pull the trigger and tip heats instantly—no waiting. Release and heat goes off.

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LONG LIFE TIP Utilizes copper for superior heat transfer, plus iron plating for durability and long life.

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RUGGED HOUSING Streamlined design. Perfectly balanced. Pistol grip lets you guide the gun easily.

You can make every kind of cut with a

WELLER SABRE SAW

Cuts through plywood, composition board, aluminum, plastics, etc. Even makes its own starting hole for inside cuts. And it's portable—use it anywhere. Exclusive strain-relief design eliminates blade breakage. Lubricated for life. 3 different blades included.

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Southbridge . . . . . Perron & Co.
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Aubuchon Paint & Hdwe. Co.
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MICHIGAN
Bay City . . Banks Hdwe. & Sup.
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J. L. Hudson Dept. Stores Co.
Flint . . . . . Gilroy Hdwe.
Geo. W. Hubbard Hdwe.
Grand Rapids . . Bulkema Hdwe.
Godwin Paint & Hdwe.
Plainfield Lumber & Hdwe.
Kalamazoo . . Miller Lumber Co.
Lansing . . . . . Densteadts Hdwe.
Van Dervoort Hdwe.
Pontiac . . . . .
F. J. Poole Hdwe. Stores
Royal Oak . . . . . Maskill Hdwe.

MINNESOTA
Minneapolis . . . . .
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St. Paul . . Warner Hdwe. Stores
All Coast-to-Coast Stores
All Gamble-Skogmo Stores
All S & Q Stores

MISSISSIPPI
Jackson
Addkison Hdwe. Co., Inc.
Natchez . Feltus Bros. Hdwe. Co.
Vicksburg . . . . .
Mississippi Hdwe. Co.
O'Neill-McNamara Hdwe. Co.
Yazoo City . . Planters Hdwe. Co.

MISSOURI
Rolla . . . . . Twitty Hdwe.
Springfield . . . . . Plaza Hdwe.
Twitty Hdwe.
St. Louis . . . . .
All "Central Hardware Co Stores"
Hill Behan Lumber Co.

MONTANA
All Coast-to-Coast Stores

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Nashua . . . . . Osgood's
All W. E. Aubuchon Co., Inc. Stores

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Camden . Reese & Whilldin, Inc.
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Greensburg . . . Bortz Hdwe. Co.
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Vaught's Stores
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Corpus Christi . Alameda Hdwe.
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Chesterland Supply
Cincinnati . . . .
Shillito's Hdwe. Dept.
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Columbus . . . . Carter Hdwe. Co.
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Seals cold out! Seals heat in!

Another Home-Saver Product by

Mortell COMPANY

KANKAKEE, ILLINOIS

A Thickness Sander for Home Shops

[*Continued from page 168*]

on its bearings. (If no lathe is available, the drum can be turned entirely in position. Take light cuts and be sure the turning chisel is well supported on a broad block of the proper height placed on the table.)

Using a table saw set at a five-degree tilt, carefully pass the drum over it several times to make the groove for the retaining wedge. Cut the tapered wedge from a strip of maple and drill four countersunk holes for ¾" #5 flathead screws.

Mounting the shaft. This is a job that should be done with care; the drum must be parallel to the table. Screw shim blocks to the rails of the table support. Shims shown are for use with the type of shaft bearing illustrated.

Bolt the bearings in position with long ½" machine bolts. The bolts should pass through the shim block and the rail, so their length will be determined by the height of the shim.

Lock a collar on the shaft on the outer side of each bearing to keep the drum from sliding from side to side. Mount the pulley on the shaft so that its inner step overhangs the rail. Then install the motor beneath it in a position that will align the motor pulley with the shaft pulley. If all dimensions have been followed, a 45" V belt will raise the hinged motor enough to maintain belt tension.

Assemble the ½"-plywood belt guard around the pulleys, cut the hardboard cover to fit, then locate and drill a 1" hole in the cover for the protruding end of the shaft. Fit an arbor to the shaft end for mounting a contour sander, wire brush, buffing wheels or other accessories.

On the opposite end of the sander shaft, mount a sanding disk. The dimensions given for the disk-sander table are for a 12" disk. If you use a 10" size, simply make the opening in the table smaller to fit around it with ⅛" clearance at front and sides. Drill ¼" clearance holes for two wing bolts and install teenuts behind the holes on the inside of the rail. This makes the table quickly removable for changing paper on the disk.

Protecting the wood surfaces. To prevent instability due to moisture in the air, apply several coats of clear wood sealer. Cover areas you can't see, too, such as the underside of the table and

CONTINUED

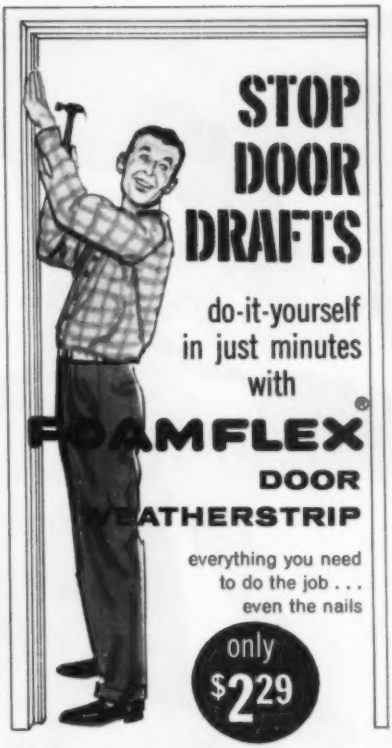
A Thickness Sander for Home Shops

shelf. Sand the hardboard table surface lightly with fine sandpaper and apply sealer. Sand again and repeat until the surface feels smooth and hard. Follow this with paste wax rubbed to a polish.

The first job on the machine should be truing the sanding drum. Tape medium sandpaper to a flat board and move it beneath the drum while it is rotated under power. Apply sealer to the drum and sand it smooth. Insert one side edge of a standard 9″-by-12″ sheet of sandpaper in the tapered groove, wrap it around the drum and insert the other edge. Press the retaining wedge in the groove over both edges of the paper and tighten the four screws. Your thickness sander is ready.

As with all sanding operations, you get best results with a light cut and slow feed. Three-step pulleys on the sander and motor shafts provide speeds of 860, 1,725 and 3,450 with a 1,725-r.p.m. motor. The middle speed is good for most jobs, but slow speed is recommended when using coarse paper, high speed for fine finishing. A ½-hp. motor will provide all the power you need, but if you have a ⅓- or ¼-hp. motor available, try it for size. It may have all the push you need for the jobs you want to do.

MOBILE MILKER. Here's a milking machine that goes to the cows instead of having them driven to it. Adapted in Sweden from a model used in Holland and Germany, it makes the rounds of eight farms, serving 65 cows daily. It is built on a Volvo chassis, is driven by a 120-hp. V-8. Its tanks hold 160 gallons.

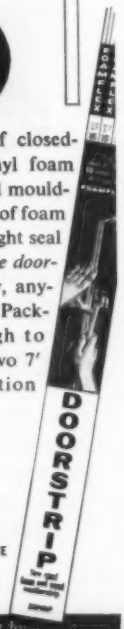


Famous FOAMFLEX consists of closed-cell, positively non-absorbent vinyl foam permanently bonded to clear wood moulding. New, exclusive "offset" design of foam edge provides perfect 2-WAY airtight seal . . . *against the door and against the door-stop!* With only hammer and saw, anyone can install in only 10 minutes. Package contains more than enough to weatherstrip the average door—two 7′ lengths, one 3′ length, instruction sheet, package of nails.

Patent Pending

- Stops wind, rain, snow.
- Silences closing doors.
- Can be painted without hardening.
- Stays flexible even at 50° below zero.
- Fits tight, even against warped surfaces.

LOOK FOR THIS DISPLAY CARTON AT YOUR FAVORITE HARDWARE OR BLDG. SUPPLY STORE.



Seals cold out! Seals heat in!

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Mortell COMPANY

KANKAKEE, ILLINOIS

YOUR SAW
Cat. No. 34-004
Delta Homecraft
9" Tilting Arbor Circular Saw equipped
with Extension Wings and Steel Stand.
OWN THE FINEST
RIGHT FROM THE START
—AND AT A BIG
$21.00 Saving
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IS WORTH $21.00

WHEN YOU TRADE IT ON THE FAMOUS DELTA 9" CIRCULAR SAW

Here's a once-in-a-lifetime opportunity to trade slow, old fashioned hand sawing for fast, easy, accurate cutting—and start your home workshop with the best!

You can get a liberal trade-in allowance for your old saw (*any kind, regardless of condition*) toward the purchase of a new Delta 9" Tilting Arbor Circular Saw.

You'll be proud to own this saw, with its New Advanced Design styling, clean lines and handsome mottled grey finish. And you'll like the ruggedness, built-in precision and safety features you get—the kind of quality you find only in Delta Industrial Tools. But, best of all, you'll enjoy the satisfaction of owning the finest of its kind—a power tool backed by over 30 years of engineering skill and experience. Why be satisfied with anything less?

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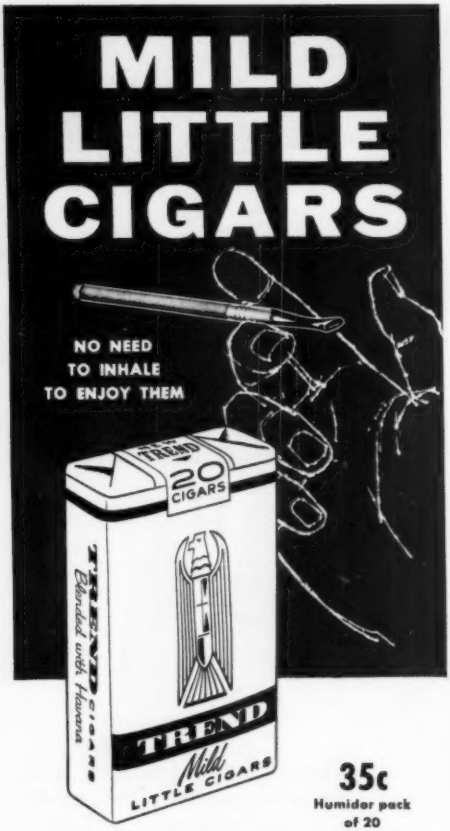

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New Filter Tip Little Cigar

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STEPHANO BROTHERS
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PIONEER IN MODERN LITTLE CIGARS

Shop-Use Report: the New Saw Smith

[*Continued from page 218*]

return it to starting position and reset the fence at the rear of the table. Finally, you butt the work against the fence again (with the blade in the kerf), and make another pass to pick up the travel gained.

With Saw Smith, the fence is always at the rear of the table. You slide the whole assembly to start position, lock it there and draw the blade forward. Then you release the locking handles and move everything back as far as it will go—saw, table, fence and work. Another lock-down and pull on the saw and you have your maximum crosscut fast and simply.

On another score the sliding table presents a problem. If you don't reposition it exactly right for miter cuts you'll mar its surface quickly with a lot of kerfs. The solution is to index the machine base so the table can always be returned and locked in the same spot.

Easy adjustment. How about construction and adjustments? First I checked the radial arm. Was it accurately parallel to the table top? I clamped a strip of wood to the arbor in place of the saw blade. Then I lowered the carriage so the end of the wood just touched the table. By swinging the arm around and moving the carriage back and forth I was able to see if they contacted each other at all points. They didn't. But by making an easy table adjustment with four cams, I brought the parts completely parallel.

Next I cut a 10″ long dado $\frac{3}{8}$″ deep in a piece of $\frac{3}{4}$″ plywood. Calipers showed me that it didn't vary more than 1/64″. I repeated the cut, this time bearing down on the carriage hard. Still the dado was only $\frac{1}{16}$″ lower at the tail end of the cut.

Saw Smith's radial-arm movement was accurately indexed. After I had adjusted it for completely square crosscutting, I found the 45-degree left and right miter settings right on the button. Would they stay that way after numerous other operations—tilting the head or swinging the arm, for example?

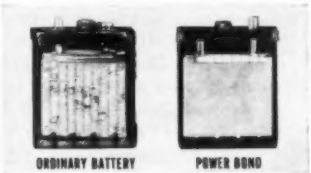
One of my first tests, then, was to cut a shallow groove in a board at zero position, and two others at the 45-degree points. At the very end of my testing program I placed the board in exactly the same position and repeated the cuts. The blade tracked the grooves accurately.

Now! For the man who can't afford battery failure!

Auto-Lite sta-ful with Power Bond is the battery for the man who *must* be there, who can't afford to trifle with time, who just can't afford battery failure. Power Bond, an exclusive Auto-Lite development, eliminates plate-destroying vibration, a major cause of battery failure.

Auto-Lite sta-ful with Power Bond needs water only 3 times a year in normal car use because it has the sta-ful extra liquid reserve above the plates. Power Bond is so good that it is registered in your name at the factory. It is the leader of a top-quality, top-value family of Auto-Lite Batteries made for both the new 12- and the older 6-volt automotive electrical systems.

HERE'S THE TOUGHEST TEST ever made on batteries! Both Auto-Lite sta-ful with Power Bond and ordinary batteries were clamped to this vibrating machine and tested for power loss at specific time intervals. See the amazing results . . .



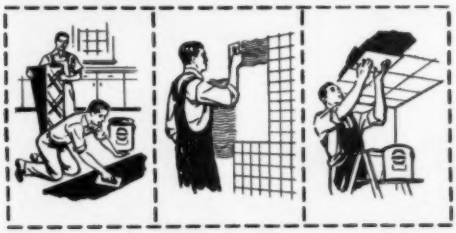
Ordinary battery plates (left) have lost vital power-producing materials and failed after only 55 hours of vibration testing. But the amazing Auto-Lite sta-ful with Power Bond (right) shows no damage at all after 1000 hours in the same test. Plates are still intact and delivering full starting power!

AUTO-LITE® sta-ful® with POWER BOND®

DRY CHARGED . . . FRESH WHEN YOU BUY! FOR MOST 12-VOLT SYSTEMS

Listen to NBC "NEWS ON THE HOUR" brought to you by Auto-Lite, Monday through Friday, 7 a.m. to 11 p.m.

Now—you can install



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- Quick Setting Tile Adhesive
- Latex Cement Patch

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Atlas PRODUCTS

America's Broadest Line of Building Products

Olds Cuts Chrome and Horsepower

[*Continued from page 125*]

there's less wear on it. It's quieter, too.

All this is in emulation of Pontiac, which has been offering economy engines for these several years.

The engines in the other two series, the Super 88 and 98, remain substantially unchanged except for an optional 300 horsepower in the Super in place of the regular 315 hp., and substitution of a two-barrel carburetor for 1959's four-barrel. Axle ratios are down on both these series.

By actual measurement, taken halfway between the front-seat lip and the point where the transmission meets the toe-board, the transmission hump in the new Olds is an inch lower and two inches narrower—5½ by 14 inches.

The two-stage headlight dimmer, an option on all General Motors cars, is made by the company's Guide Lamp Division and is called the Guide-Matic. It's a sophistication of the old Autronic-Eye. When the lights of an oncoming car energize the system's photoelectric cell, relays switch all four headlights to low beam. A half-second later, the inboard lights are quenched entirely. GM calls this development its Safety Salute.

A third less parking effort is required for manual steering. That's due to the overall ratio, now at 33.2:1 compared with the former 29.4.

The styling of the 1960 Olds is subdued, as though it had been cut to the quick by a slighting remark about its spangles. The 1958 model year was Olds' high-water mark in sheer gaudiness. The 1959 car was in better taste. Now it's positively demure.

The Olds is actually a bit higher as well as shorter, but in the words of the sketch artists, "it 'reads' lower and longer." In response to some backtalk from owners on the difficulty of parking 18½ feet of automobile, the two front-end corners are swept back. This reduces the distance from the front wheels to the bumper by one and two-tenths inches. It's a mite easier to park.

The rear overhangs are still prodigious—five full feet for the 98 series and only an inch less for the 88 and Super 88. But that's par for the course. Most of the Olds' competitors stick out that far in back, too.—*Devon Francis.*

For pro or amateur . . .

TOP POWER FOR THE JOB!

FOR HOME CRAFTSMEN

New B&D 6½" Utility Saw

SPECIAL INTRODUCTORY PRICE

$45.95

After December 25, 1959, $49.95

Quality at low price! With new sawdust ejector and calibrated depth adjustment *plus* all the features of heavy-duty models! Cuts to 2 3/32" at 90°, 1 13/16" at 45°. Perfect model for small budgets, now specially priced for limited time!

FOR THE PROFESSIONAL

Job-tested B&D 6½" H. D. Saw

ONLY **$69.50**

Top quality in a lightweight, heavy-duty saw . . . for use portably or in a saw table. Provides power to spare for any sawing job; cuts through a 2 x 4 at 45°. Cuts to 2 5/32" at 90°, 1⅞" at 45°.

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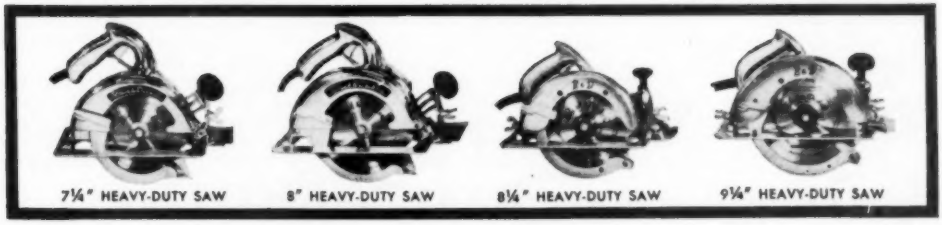
"TOP 10" SAWS

On the job at America's top ten construction projects



7¼" HEAVY-DUTY SAW | 8" HEAVY-DUTY SAW | 8¼" HEAVY-DUTY SAW | 9¼" HEAVY-DUTY SAW

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See your local dealer in a partial listing in September POPULAR SCIENCE and on this page.

If your local Building Supply or Hardware Dealer is not listed . . . mail your name and address to POPULAR SCIENCE, Dept. 1106, 355 Lexington Avenue, New York, New York, for your entry blank.

REMEMBER, all entries must be postmarked by midnight Oct. 31st, 1959. In case of tie, duplicate prizes will be awarded. All entries will be judged by POPULAR SCIENCE editors.

Partial List of Dealers Joining 5th Annual Home Improvement Program

Millwork-Glass Building Supplies
P. O. Box 691
Juneau, Alaska

O'Malley Lumber Co.
4th Avenue & Madison
Phoenix, Arizona

Atlantic Lumber Co.
6327 South Atlantic Blvd.
Bell, California

Home Lumber Co.
300 Broadway
Chula, Vista, Calif.

Sylvan Lumber Co.
7200 Auburn Blvd.
Citrus Heights, Calif.

A. M. Dary Co., Inc.
3605 E. Anaheim St.
Long Beach, Calif.

Tynan Lumber Co.
P. O. Box 268
Monterey, Calif.

Frank G. Noyes Co.
929 Third Street
Napa, Calif.

Burritt Building Materials, Inc.
415 Knowlton Street
Bridgeport, Conn.

Armstrong & Dobbs, Inc.
315 Oconee Street
Athens, Georgia

Boise Building Supply
6909 Fairview Avenue
Boise, Idaho

Boise Payette Building Center
220 South 3rd
Boise, Idaho

Irrigators Lumber Co., Inc.
Albany at Seventh Ave.
P. O. Box 99
Caldwell, Idaho

Boise Payette Building Center
Box 518
Emmett, Idaho

Boise Payette Building Center
Box 66
Hazelton, Idaho

Boise Payette Building Center
Box 368
Idaho Falls, Idaho

Bestway Building Center
Box 426
Lewiston, Idaho

Boise Payette Building Center
Box 517
Montpelier, Idaho

Boise Payette Building Center
Box 469
Nampa, Idaho

Boise Payette Building Center
Box 188
Rexburg, Idaho

Mickelsen's
142 West 1st North
Rexburg, Idaho

Boise Payette Building Center
Box 36
St. Anthony, Idaho

Boise Payette Building Center
Box 1077
Twin Falls, Idaho

Builder's Supply Co.
1308-14 Jefferson Ave.
Lawrenceville, Ill.

Thompson Lumber Co.
612 South Neil Street
Champaign, Illinois

Joseph Lumber Co.
2001 No. Narragansett
Chicago 39, Illinois

Vermilion Lumber Co.
615 North Jackson Street
Danville, Illinois

Haynes Milling Co.
Lumber Department
Portland, Indiana

Home Lumber Co.
Franklin & Grant Avenue
Junction City, Kansas

Big Six Lumber Yard
6601 East Kellogg
Wichita, Kansas

The Jenkins-Essex Co.
142 East Dixie Avenue
Elizabethtown, Ky.

The Wm. D. Bowers Lumber Co.
231 East Patrick St.
Frederick, Md.

Allegan Lumber Co.
Allegan, Michigan

Wood Lumber Co.
Bangor, Michigan

Beverly Lumber Co.
1101 Pipestone
Benton Harbor, Mich.

Decatur Wood Products
Decatur, Michigan

Hutchins Lumber & Supply Co.
Douglas, Michigan

Stegath Lumber Co.
Box 302
Escanaba, Mich.

Johnson-Howard Lumber Co.
510 North Edwards
Kalamazoo, Michigan

Millers Lumber Co.
1919 Factory St.
Kalamazoo, Michigan

Sportel Lumber Co.
424 East Michigan
Kalamazoo, Michigan

The Renier Company, Inc.
1600 Southfield
Lincoln Park, Michigan

Mt. Clemens Lumber Co.
P. O. Box 672
1010 S. Gratiot
Mt. Clemens, Mich.

Schrader Lumber & Coal Co.
125 North Whittaker St.
New Buffalo, Michigan

Niles Lumber Co.
Niles, Michigan

Portage Lumber Co.
Portage, Michigan

Plainwell Lumber Co.
Plainwell, Michigan

Pullman Supply Co.
Pullman, Michigan

Kler's Custom Woodwork
28220 Harper Avenue
St. Clair Shores, Mich.

Kauffman Lumber & Coal Co.
Schoolcraft, Michigan

Partial List of Dealers Joining 5th Annual Home Improvement Program

Michigan Shore Lumber & Supply Co.
South Haven & Coloma
South Haven, Michigan

Walter Winkel Lumber Co.
Dunkley Avenue
South Haven, Michigan

Warren City Lumber Co.
4027 East 9 Mile Rd.
Warren, Michigan

Oxboro Lumber Company
9421 Lyndale Ave., South
Bloomington, Minn.

S. Hage Lumber Co.
Madelia, Minn.

Acme Stone & Lumber Co.
3200 France Avenue, South
Minneapolis, Minn.

N. C. Bennett Lumber Co.
2825 Fifth Avenue, South
Minneapolis Minn.

Bloom Dale Lumber Inc.
10508 France Avenue, South
Minneapolis, Minn.

Crystal Lumber Co.
5353 Lakeland Avenue
Minneapolis, Minn.

DeLong Lumber Co., Inc.
4360 North Lyndale
Minneapolis, Minn.

Hiawatha Lumber Co.
3233 East Fortieth St.
Minneapolis, Minn.

Southtown Building Materials
8436 Pillsbury Avenue
Minneapolis Minn.

Westlund-Westerberg Lumber Co.
3105 Hiawatha Avenue
Minneapolis, Minn.

O. P. Foss Lumber Co.
14 North 7th
Moorhead, Minn.

Howard Lumber Co.
4719 42nd Avenue, No.
Robbinsdale Minn.

Johnson Cashway Lumber Co.
1820 R Street
Lincoln, Nebraska

Sailor Lumber Co.
164 W. Front Street
Stater, Mo.

Comfort Coal-Lumber Co.
130 Passaic Street
Hackensack, N. J.

General Lumber Co. of N. J.
204 Clinton Street
Hoboken, N. J.

Phillipsburg Supply Co.
33 Sitgreaves Street
Phillipsburg, N. J.

Davidson & Case Lumber Co.
320 South Bickford
El Reno, Oklahoma

Pantzer Lumber Co.
Sheboygan, Wisconsin

Scott Lumber Co.
1301 East 10th St.
Amarillo, Texas

Foxworth-Galbraith Lumber Co.
Box 1115-301 E. 7th Street
Dumas, Tex.

Menefee Lumber Co.
5506 Bellaire Blvd.
Houston, Tex.

Charles L. Lenau Lumber Co.
P. O. Box 98
Muleshoe, Tex.

Alamo Heights Lumber Co.
5939-41 Broadway
San Antonio, Tex.

Tri-State Building Center
116 North Main
Bountiful, Utah

Tri-State Building Center
Box 128
Murray, Utah

Tri-State Building Center
1164 East 21st Street
Salt Lake City, Utah

Tri-State Building Center
Box 266
Tremonton, Utah

Peninsula Supply Co.
3404 Virginia Avenue
Newport News, Virginia

Bestway Building Center
Box 174
Kennewick, Washington

McEvoy-Rogers Lumber Co., Inc.
319 Kirkland Ave.
Kirkland, Wash.

Bestway Building Center
Box 37
Moses Lake, Wash.

Bestway Building Center
Box 266
Naches, Wash.

Bestway Building Center
Box 529
Pasco, Wash.

Bestway Building Center
Quincy Wash

Bestway Building Center
Box 2148
Spokane, Wash.

North Side Building Supply
E. 707 Francis Ave.
Spokane, Wash.

Bestway Building Center
South 6th Street
Sunnyside, Wash.

Brookdale Lumber Co.
13602 Pacific Avenue
Tacoma, Wash.

Bestway Building Center
Box 266
Yakima, Wash.

Butler Lumber Co.
4539 N. 124th St.
Butler, Wisconsin

Bliffert Lumber & Fuel
6826 South 13th Street
South Milwaukee, Wis.

Wilbur Lumber Co.
7919 W. National Ave.
West Allis, Wis.

Peterson Building Supply Co.
4777 8th Street, South
Wisconsin Rapids, Wis.

Boise Payette Building Center
Box 436
Casper, Wyoming

Casper Lumber, Inc.
404 E. Railroad Ave.
Casper, Wyoming

Boise Payette Building Center
Box 377
Cheyenne, Wyoming

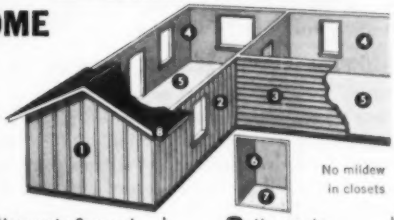
Tri-State Building Center
Box 16
Rawlins, Wyoming

Tri-State Building Center
Box 959
Rock Springs, Wyoming

J. R. Rodgers
Ball Planing Mill
60 Bayfield St.
Barrie, Ontario

8 WAYS TO REDUCE COSTS AND INCREASE QUALITY IN BUILDING YOUR NEW HOME

For certain applications, the *lowest-cost materials* you can use are *the highest quality* products in their field. This is true of Homasote products—by their very nature and by their wide variety of sizes, forms and thicknesses. Here are some of the savings possible—compared with other standard building materials—on a 3-bedroom house with 1200 square feet of exterior wall surface...



REDUCE YOUR COSTS BY $515 TO $1712	1 Homasote Board-and-Batten	2 Homasote Grooved Vertical Siding	3 Homasote 12" Siding
4 Homasote Interior Walls	$220 to $1092	$175 to $1048	$110 to $ 983
5 Homasote Sub-Flooring	297 to 480	297 to 480	297 to 480
6 Closet Walls	34 to 40	34 to 40	34 to 40
7 Closet Floors	29 to 46	29 to 46	29 to 46
8 Facia and Rake Molds	11 to 14	11 to 14	11 to 14
	34 to 40	34 to 40	34 to 40
	$625 to $1712	$580 to $1668	$515 to $1603

Further savings occur, because Homasote methods also reduce application costs.

FREE—HOMASOTE'S COST-REDUCTION ANALYSIS. Send us the plan for your new home—without cost or obligation. We will show you just how these savings can be effected—in your area—on your particular house. Your plan will be treated confidentially and returned to you. Or—for further details—send 10¢ for the 72-page Homasote Handbook.

Remember—Homasote products increase the quality, comfort and life of your home—as well as reducing the original cost
Kindly address Dept. K-5.

50 years AT YOUR SERVICE

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TRENTON 3, NEW JERSEY
Homasote of Canada, Ltd., 224 Merton Street, Toronto 12, Ontario

TAXI ENGINES RUN 200,000 MILES . . . AND SO CAN YOURS!

Do as fleet owners do—replace key parts and get like-new pep and power!

Your car engine is *not* worn out at 40,000 or 50,000 or 60,000 miles. Take a tip from the experts who own and run huge fleets of cars and trucks. Overhaul the engine, replace key parts such as bearings and rings . . . and get back all the pep and power of a brand-new car!

SYMPTOMS OF BEARING WEAR

Your car will tell you when it needs new engine bearings. Is it sluggish or slow; does it miss, knock or ping? Is your gas mileage low; do you need oil *again?* Are spark plugs fouled with sludgy black oil and carbon? Then it's time for an overhaul—and new Federal-Mogul bearings.

FOR AN "OVERHAUL", BEARINGS

You're wasting money on any overhaul that doesn't include new engine bearings. Parts account for the smaller portion of the cost, so it pays to do the job *right* the first time. Even new piston rings can't control the 25-times normal oil throw-off from worn engine bearings.

FEDERAL-MOGUL *MEANS* BEARINGS

Bearings are the heart of your engine. Yet when you need main, con rod or camshaft bearings, *it costs no more* to use the best—Federal-Mogul Engine Bearings. Ask your mechanic . . . he knows and trusts Federal-Mogul quality!

FEDERAL-MOGUL SERVICE

Division of Federal-Mogul-Bower Bearings, Inc. • Detroit 13, Mich.

Strange New Ship Hauls Cooking Gas

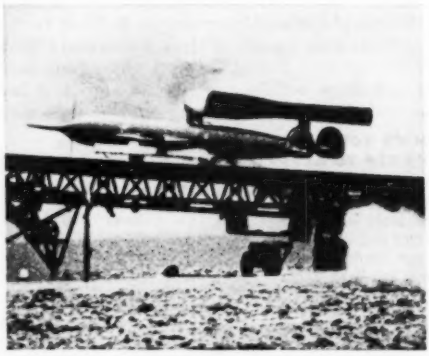
[*Continued from page 79*]

lightning damage, but even if waste gas were ignited at the vent, the flame could be snuffed by closing the vent briefly.)

The Pioneer docked in England uneventfully and on schedule. Then another tough operation began: Discharging its chilly cargo into the lines of the North Thames Gas Board on the Thames River near London.

Next: the supertanker. When you know how to do it, transporting liquefied natural gas is actually safer than shipping gasoline or fuel oil. When spilled, methane doesn't spread as fast as either of these. It's lighter, and its vapor rises and dissipates, rather than collecting dangerously in low places. Its ignition temperature is twice as high as that of regular gasoline, and burning requires a rich five-percent mixture (a 1½-percent mix of gasoline vapor and air burns).

The lessons learned from the pilot ship are to be used in building ships with 10 times its capacity. Already John Murphy has bought up 80,000 linear feet of balsa for the first methane supertanker. It will be twice as long, twice as wide, and have three times as many tanks as the Pioneer. Right now, Constock officials are busy developing markets in many parts of the world and negotiating for natural gas that would otherwise be burned as waste.



COASTAL-DEFENSE ROBOT. Here's a new radio-controlled missile recently installed to guard Sweden's coast. The 28-foot, 1,300-pound projectile, shown on a rocket sledge astride its 20-foot runway, has a range of 160 miles, travels at 300 m.p.h. and carries a parachute.

cuts 4 x 4 at 45°...6" log...fine scroll work...complete safety

½HP WEN SOUPED-UP SABRE SAW

AMAZING—*First* and *only* portable electric saw to give you all these features!

- cuts a 6" board or 6" log yet cuts any pattern, too!
- cuts all metals up to ½" steel and 2" pipe!
- cuts 4x4 at 45° . . . fine pattern work in most any material, including sheet metal and sheet steel!
- does everything a pattern saw will do . . . out-performs a circular saw . . . works as band saw or nibbler, too!
- beautifully balanced, lightweight, smooth-running . . . completely safe!
- makes cuts only a chain saw could—until now!

SPECIFICATIONS:
Motor: 110V 6 amp AC-DC. Length: 8". Width: 7". Height: 7½". Weight: 6 lbs. Powerful ½ H.P. motor delivers 3400 strokes per minute; length of stroke: 1". 3-wire 8 ft. cord with adaptor. Heavy duty roller and oilite bearings. UL listed under industrial classification.

MODEL 909

only **$44.95** complete

Look what you get! rip guide, circle cutter, 45° tilting base plate and 7 blade complement—the right blade for every job!

WEN PRODUCTS, INC.
5818 Northwest Highway, Chicago 31

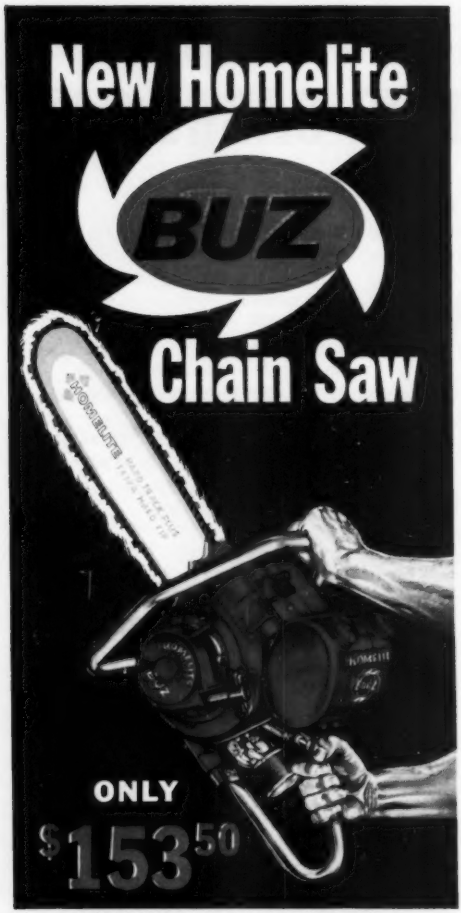
Exported by: Scheel International, Chicago

Model 505 Power Saw Kit
8 saws in 1! Cuts 2 x 4's, ½" steel, anything! Works as rip saw, jig saw, cross cut, scroll, coping, hack, band and keyhole saw. Cuts any shape, makes own starting hole. Saw Kit with saw, rip guide, circle cutter, 5 blades, **$29.95.**

Sander-Polisners and Kits
Straight-line action for perfect, scratch-free surfaces. Sand wood, metal, plaster patches, etc. Polish car, furniture, any surface. 3 types—fine finishing, general utility, heavy duty. **$13.95 to $19.95**

2-Speed ⅜" Power Drill
Lets you change from 1000 to 3000 rpm to get just the right speed for different jobs. Delivers maximum torque under load. ⅜" Jacobs geared chuck. 35 piece Accessory and Toter Kit. **$9.95. Drill only, $29.95.**

Electronic Soldering Guns
for practically all home soldering jobs. Working hot in 2½ to 5 seconds. Long reach, long life tips, automatic spotlight. 6 models 100 to 250 watts. **$5.95 to $15.95**



COMPLETE, F. O. B. FACTORY

The new Homelite BUZ is the first direct-drive chain saw to give you quality performance at a price everyone can afford . . . only $153.50 complete, F. O. B. Factory!

It cuts 16" trees in 16 seconds, fells trees up to 3 feet in diameter. Light 19 pounds (less bar and chain) are easy to handle on any cutting job or carry to a campsite. Famous Homelite short-stroke engine and diaphragm carbureter give you full cutting power in any position. Flush-cut handle lets you cut level with the ground.

Ask your Homelite dealer for a free demonstration.

Send 10¢ for informative 16-page booklet "A Man's Guide To Chain Saws."

HOMELITE
A DIVISION OF TEXTRON INC.
710 RIVERDALE AVE.,
PORT CHESTER, N.Y.

THINK FIRST OF QUALITY . . . THINK FIRST OF HOMELITE

The Handy Art of Riveting

[*Continued from page 173*]

grees) to a depth equal to one-half the rivet-body diameter. Then hammer the end until it fills the countersunk pocket. File off any material projecting beyond the surface of the work.

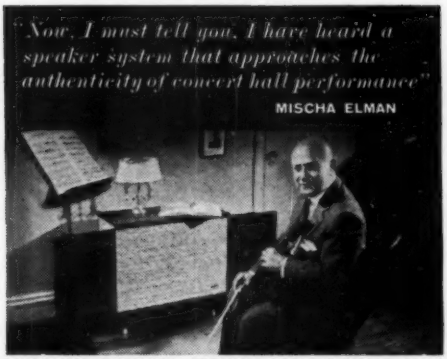
Installing tubular rivets. When you apply these to leather or other materials they can cut, position the parts on a steel block and hammer the rivets through until they touch the metal. Then shift the work to align the shank with a hole drilled through the support. Continue hammering until the head is flush with the surface of the joint. Turn the work over. If a tight-fitting washer, or "burr," is needed to get a broad grip on a soft material, place it on the rivet end and snug it down with a rivet set, or any bar having a hole through which the shank will pass.

The tubular end should project far enough for firm clinching. To spread it, you can place a centerpunch tip in the hole and tap the punch with a hammer. Often it's enough just to flare the material. If not, use a punch to split the end into several segments; then flatten them with a few light hammer taps. Don't overdo this—you'll only thin out and weaken the material.

Another way to flare tubulars is to spin them on a lathe or drill press. Here the rivet is brought into contact with an ordinary centerpunch spinning in the chuck. Under light pressure, the punch tip first flares the rivet end, then curls it back neatly.

Using split rivets. We've already seen that this type tends to cleat itself when driven into soft materials. You can help this along, when bedding them in wood, by placing the prongs in a position that lets them straddle the grain.

If materials are too hard for the prongs to penetrate, first drill or punch holes, insert the rivet, add a burr if needed, and then spread the prong ends. Use the same technique for bonds between hard and soft materials—when the hard one is nearest the prongs. If the joint is the other way around, back up the softer material with a steel block and drive the rivet straight through the assembly. The prongs should spread the curl backward as they strike the block, bedding themselves firmly in place.



UNIVERSITY'S TOTALLY DIFFERENT STEREO SYSTEM—THE NEW 'TRIMENSIONAL' TMS-2

- Two complete speaker systems in one enclosure
- Unprecedented compactness—only 30" wide
- A third dimension to stereo sound . . . DEPTH
- Placement anywhere in a room
- For monophonic and stereophonic reproduction
- Uncompromised quality at an attractive price

Send for FREE 16 page brochure, *An informative guide to high fidelity stereo and monophonic speaker systems and components.* Write Desk B-3, University Loudspeakers, Inc., White Plains, N. Y.

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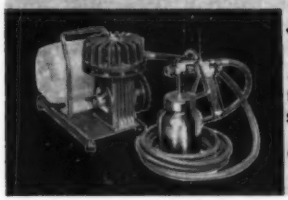
FAMOUS MEN OF MUSIC·CHOOSE UNIVERSITY

Every Home needs a RED HEAD Sprayer



complete kit less motor

$44

at your dealers

Go easy on yourself! Let a Red Head do your chores — spray painting, waxing, greasing, inflating, cleaning, garden spraying, insecticide fogging, many others! Get professional results every time!

Powerful new Red Head outperforms them all, even many large ½ hp units! Delivers clean, oil-free air at 3.5 cfm and 50-psi pressure. Only 10" high, weighs under 30 lbs. Use any ¼ hp or larger motor.

Write for literature today!
37 Other Models from $30

JOHNSON SERVICE COMPANY, Compressor Division
Dept. AA, Milwaukee 1, Wisconsin

Please send literature and special offer to

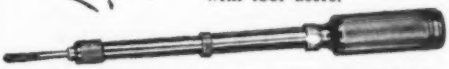
Name.....

Address.....

City.....State.....

In these days of nuclear power, monkeys in orbit and dogs in space suits, some hands never use their skill. And honestly, it isn't always easier or faster to use power tools where hand power will do . . . and it's often not as satisfactory. Take screw driving for example.

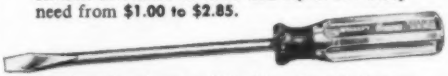
There's a Stanley screw driver that's exactly right for every screw and a "Yankee" push drill that's exactly right for preparing any pilot hole. Here are a few that are favorites with tool users.



"Yankee" No. 41 Push Drill is a precision tool with 8 drill points from 1/16" to 11/64" in the magazine handle. A real mechanic's tool. Only **$6.95** complete.

"Yankee-Handyman" No. 46 Push Drill is a popular priced tool with 4 drill points in magazine handle. Makes quick work, easy job of small holes. Only **$3.98.**

Stanley "100 Plus" Screw Drivers are the finest screw drivers made. They can take it. Bolster type blade strengthens bar against prying strains. Available in sizes and styles for every need from **$1.00 to $2.85.**



Stanley-Handyman "Cushion-Core" Screw Drivers are just right for home use. Red core in handle resists pounding. Available in sizes and styles for every need from **49c to $1.10.**

• • •

Remember the name Stanley when you buy tools. Stanley is the tool box of the world.

STANLEY TOOLS,
Division of
The Stanley Works,
New Britain, Conn.

STANLEY ®

"MY PRINCIPAL 'TOOL KIT' FOR BUILDING MY 6-ROOM HOUSE WAS VISE-GRIP"

The True Story of Marcel Lacasse, St. Johns, Quebec

"I'm a do-it-yourselfer just completing my 6-room bungalow. Lack of funds kept me from buying a home builder's tool kit. Instead, I bought two Vise-Grips which have helped me everywhere—in plumbing, electrical work, carpentry! Vise-Grip is truly many tools in one."

VISE-GRIP Does More Jobs Easier than Any Other Tool

You'll find *hundreds* of uses for powerful, all-purpose Vise-Grip. It's a pliers, wrench, clamp, hand vise, wire cutter—all in one tool! Ask for the new Vise-Grip with Easy Release. Only $2.15 to $2.95 at your hardware store.

PETERSEN MFG. COMPANY
Dept. PS-10, DeWitt, Nebr.

PEEL OFF PAINT

- Remove old finishes easier, faster
- Non-inflammable and needs no afterwash
- For wash-off or scrape-off use

Heavy-Bodied KLEAN-STRIP
PAINT REMOVER
THE KLEAN-STRIP CO., INC.
2340 S. Lauderdale, Memphis 6, Tenn.

The Tragic Truth About Taking Dope
[*Continued from page 83*]

Recent investigations show, too, that by affecting the pituitary gland, morphine affects the adrenal and the sexual glands as well. This explains why some women drug-takers stop menstruating and why men and women alike have a lessened desire. And this in turn points to the basic explanation of dope-taking in certain cases—it relieves a problem, the sexual drive, that some people don't want to be bothered with.

What happens when a drug-taker can't get it?

His changed chemistry starts reverting to normal—a very painful process. Six or eight hours after his last dose of morphine, the addict becomes nervous and anxious. In another few hours he feels bad all over—something like having the flu. He crawls into a corner, draws his knees up, falls into troubled sleep.

After a day of abstinence, his eyes and nose run, he sweats, and he suffers wave after wave of gooseflesh. The symptoms grow worse—a severe aching in the legs and in the back, a twitching of muscles in the arms and legs, vomiting, diarrhea. He has a slight fever, his blood pressure is up, he breathes more rapidly. He can't eat. He is utterly miserable.

The symptoms reach a peak after a day and a half or two days. After three days they begin going down. By the fifth day he feels as if he were getting over the flu. A few days later he may still be weak and nervous but he has just about licked the withdrawal sickness.

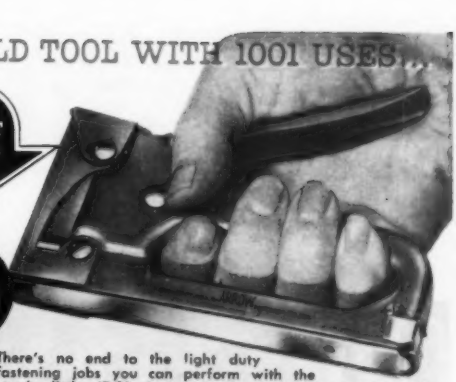
Dependence on drugs may have complicated causes

When a person takes a drug like morphine, according to one likely theory, his autonomic nerve centers try to compensate for its depressant effect. They do this through certain chemical changes intended to keep the body processes on an even keel. But the depressant effect is just what the drug-taker values. In order to get it he has to keep the compensatory forces in check by taking more and more narcotic. When his body no longer has the drug, the compensatory forces take over and it is some days before a balance

CONTINUED

MODERN, HANDY HOUSEHOLD TOOL WITH 1001 USES...

ARROW JUNIOR STAPLE GUN JT 21



FEATURE FOR FEATURE . . . GIVES YOU MORE FOR YOUR MONEY THAN ANY OTHER STAPLING GUN SELLING AT THIS LOW PRICE!

ONLY $4.95

- **UNIQUE SAFETY COMPRESSION HANDLE**
  Compression handle stops at proper position to prevent pinching or shearing of hand between handle and frame.
- **SAFETY LOCK**
  Holds compression handle in non-shooting position which cannot be opened by children.
- **NON-JAM LOADING MECHANISM**
  Precision-locked loading mechanism prevents bunching up of staples, thus assuring smooth, continuous flow.
- **BUILT FOR LONGEVITY**
  Special shock-absorbing bumper designed to lengthen life of gun.
- **VISUAL REFILL WINDOW**
  Permits user to know at a glance when staples in gun are running low.
- **BUILT-IN STAPLE LIFTER**
  Conveniently built-in lifter at base of gun for immediate removal of staples without staple gun leaving hand.

There's no end to the light duty fastening jobs you can perform with the sturdy little JT-21 Junior Staple Gun! Every day you'll find many new uses for it in and around the house! Loads 100 staples in 2 sizes — 1/4" and 5/16". Locks to fit in pocket for easy portability. Comes in attractive colors . . . making perfect gift for the housewife. Buy at better hardware, lumber, building supply and stationery stores everywhere.

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ARROW FASTENER COMPANY, INC.
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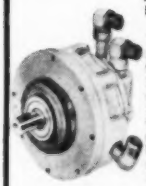
Makers of Staplers, Tackers & Pliers . . . For Every Purpose . . . in Every Price Range

Special Values... New Surplus Equipment!

OIL GEAR HYDRAULIC MOTOR



Disp.: .342 cu. in./rev. R.P.M.: 1500 Maximum Pressure: 1100 P.S.I. Max.
Torque: 45 inch pounds. Motor has a 4⅞" dia. flange four bolt mounting. Shaft is ⅝" standard with Woodruff keyway. Has ⅜" pipe thread ports fitted with removable ⅜" O.D. fittings for seamless steel tubing. Rotation —either direction. 5¾" L. x 4⅞" D.
Shpg. wt., 13 lbs. F.O.B. Chicago
No. 540R $24.00

Four-Way Open Center HYDRAULIC CONTROL VALVE

Valve has built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder or reversible hydraulic motor. In neutral position, cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has ¾" pipe thread inlet and outlet. ½" pipe thread cylinder ports. Finger grip handle.
Shpg. wt., 10½ lbs. F.O.B. Chicago
No. 126 $23.50

PESCO GEAR TYPE HYDRAULIC PUMP

Continuous duty; positive displacement .993 cu. in./rev. Delivers 6 G.P.M. at 1600 R.P.M., 1200 P.S.I. Requires 7 H.P. Speed range is 400-2000 R.P.M. Max. pressure 1500 P.S.I. Max. delivery 7.5 G.P.M. at 2000 R.P.M. ¾" pipe thread ports, ¾" shaft with Woodruff keyway. 2 hole base mounting. Clockwise rotation. 5" L. x 4⅛" W. x 7¾" H.
Shpg. wt., 11 lbs. F.O.B. Chicago
No. 160R $24.50

The hydraulic pump, valve and hydraulic motor may be used together for a fully reversible hydraulic drive system. Two of the No. 540R motors may be driven from the pump for greater power.

STEEL TANKS—Bargain-Priced for Fast Selling!

Use these tanks on compressors, for tire inflators, pulsation chambers, floats, buoys, hydraulic reservoirs, fluid containers, etc.

Type G-1 — Capacity, 2100 cu. in. (9 gals.) 450 P.S.I. ¼" port at each end. Stainless steel. 24" L., 12" dia.
Shpg. wt., 19 lbs. F.O.B. Chicago
No. 63 $14.95 each Two for $27.00

Type D-2 — Capacity, 500 cu. in. (approx. 2 gals.) 450 P.S.I. ¼" threaded openings at each end. Carbon Steel. 24" L., 6" dia.
Postpaid **$4.95**
No. 391 Two for $8.50

FREE! New, Big GROBAN Catalog! Bargains for farm, home, factory, workshop! WRITE TODAY for your FREE Copy!

GROBAN SUPPLY COMPANY Dept. PS-10
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Finest Domestic and Imported Woods
... Mouldings, Hardware, Tools ...
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Your complete wood buying guide and project book. Craftsman is your best, most complete source of finest kiln-dried domestic and rare imported woods, beautiful wood inlays, colorful bandings, matched plywoods, embossed mouldings, carved ornaments, newest woodworking tools, "hard to find" cabinet hardware and fittings... more than 1500 items! Packed with newest scroll saw patterns, project ideas and money making plans. Enclose 25c (refunded with first order) to help pay mailing, handling cost. Write:

NEW!!
- Mosaic Tile Kits
- Period Clock Kits
- New Line of Metal Legs
- Over 1,500 Items!

CRAFTSMAN WOOD SERVICE COMPANY, Dept. B-10
2729 SOUTH MARY STREET - CHICAGO 6, ILLINOIS

The Tragic Truth About Taking Dope

is restored. When the drug is withdrawn, the symptoms are often the opposite of those on first taking drugs.

The habitual user of drugs, then, keeps on taking them not only to generate a rosy glow, but also to hold off a very unpleasant illness. In many cases something else may be important, too—the work involved in getting a steady supply of the drug. This "hustling" gives an addict what everybody has to achieve some way—a sense of accomplishment.

What can be done for a drug taker?

A note to the U. S. Public Health Service Hospital, Lexington, Ky., will bring him an application form and a pamphlet, "Information for Prospective Voluntary Patients." The Lexington hospital accepts women from any state and men from east of the Mississippi. Men from west of the Mississippi are usually treated at the Public Service Hospital in Fort Worth. Many cures are achieved. But even among those patients who stay the several months necessary to be cured, many also relapse.

Experiments at Lexington point to the answer. They show that narcotics relieve not only pain but also the anxiety produced by the anticipation of pain—and pain, of course, need not be physical but in our hearts and heads.

Psychiatrists who have studied them say narcotic takers, by and large, are often intelligent people, cursed with inadequate personalities, who find many of life's problems exceedingly painful.

The same thing is true of many alcoholics, these psychiatrists say. But the type of person who relies on alcohol is often at heart aggressive. Alcohol lowers the barriers and lets him get in there and fight, or try to make love, or raise the devil. But the man who relies on narcotics just wants to get away from it all.

Once the addict's physical dependence on drugs has been broken, the problem is to get him to see why he took drugs in the first place and then to help him find acceptable ways of meeting his troubles.

Surveys of former Lexington patients indicate that when they get needed help—for instance, in finding a place to live, in getting a job, in steering clear of drug-

CONTINUED

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ALL-NEW

Radial Arm Saw

WITH PATTERNMAKER PRECISION AND "DUAL PORTABILITY"

FIRST RADIAL SAW WITH DUAL PORTABILITY EVER OFFERED AT ANYWHERE NEAR THIS LOW PRICE!

So many more features for so much less . . . *all* the accuracy and twice the versatility in a rugged, big capacity precision instrument that produces an endless variety of professional quality work!

Powerful 1 hp automatic safety clutch saw makes all cuts easily: cross cuts, dados, rips, mitres, bevels, cove cuts, etc. Other features include: widely spaced fully protected ball bearing carriage, heavy-duty ⅝" Acme elevating screw inside extra sturdy ground nickle-plated column, automatic self positioning precision adjustments, automatic quick changing lever adjustments, anti-kickback in front of blade, fingertip power control, 8-second blade coast-down, full 180° swing, and many other outstanding features.

NEW! Special plastic impregnated table guaranteed not to warp!

USE AS A PORTABLE SAW . . . 7" saw detaches in 8 seconds.

OR A RADIAL SAW . . . makes every cut!

POWER Shopmate TOOLS JOB TESTED

At hardware and building supply dealers or write
PORTABLE ELECTRIC TOOLS, INC.
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SAVE OVER $100
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MAIL THIS COUPON FOR INFORMATION ON THE SHOPMATE RADIAL SAW! PS-109

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WELD BRAZE SOLDER CUT

4 WAY WELDER
ONLY **$14.75** f.o.b. factory

Complete with Twin Carbon Arc Torch and accessories . . . to handle all metal-craft work.

Acclaimed by thousands of Homeowners, Mechanics and Hobbyists as the welder of 1001 uses. Easily operated from properly wired 110 volt AC or DC line. **The ideal gift with a life-long use . . .** Order today on 10 day money back guarantee.

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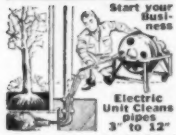
CLOGGED SEWERS
REMEMBER THE COSTLY PLUMBING BILL—

Attachable Cutter Blades



Start your Business

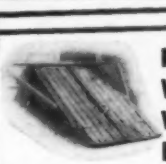
Electric Unit Cleans Pipes 3" to 12"

Chicago—Oct. 1. Just introduced is a Free Booklet on machines which enable the Home Owner, Janitor or Factory Maintenance Man to Rod-it-himself—

Yet anyone can operate this **new Rodding Tool** which is whirled down the drain in a few seconds. **SINKS, BATHTUBS, TOILETS, URINALS, FLOOR DRAINS, HOUSE TO STREET SEWERS** can be cleared of Rags, Grease, Paper, Sand while Cutter blades can be added for removing roots. A new discovery in Swedish Music Wire gives the rod 100% more Flexibility.

Another new unit is the Miller Electric Rodder which has patented cutters that expand automatically to the size of the pipe. It will clean out heavy obstructions in pipe diameters 3" to 12". Smaller Sizes available. But now, what are these Tools worth in **COSTLY PLUMBING BILLS SAVED.** Tear this Ad out—and write your name and address beside it for **FREE BOOKLET** on Hand and Electric Units. Obey that urge. No Agent will call. A postcard will do (Chicago Phone Kildare 5-1702)

MILLER SEWER ROD, Dept. PR-10
4640 N. CENTRAL AVE., CHICAGO 30, ILLINOIS



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. . . and your basement entrance will be weathertight, good-looking — for a lifetime. A spring-balanced Bilco door floats open at a touch . . . locks securely . . . costs so little. And you can install it yourself — in just a few hours!

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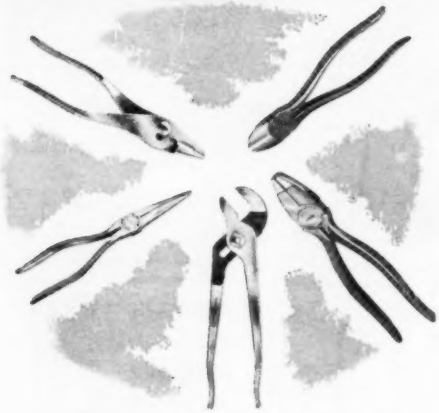


Full Polish Finish Quality Pliers

Any job is a hard job without the right tools. These special purpose Channellock quality pliers will help you do hundreds of jobs easier, faster. They're precision-built of high grade drop forged steel to last longer, work better. And you'll like the gleaming, full-polished finish at no extra cost.

Ask for Genuine Channellock pliers by name. Look for the trademark on the handle.

CHAMPION DeARMENT TOOL COMPANY
MEADVILLE, PENNSYLVANIA

taking former associates—they have an excellent chance of staying cured.

What about the crazy, murderous "dope fiend?"

Drug-addiction authorities insist that we have been oversold on him. In any event he is often actually *not*—like most habitual dope-takers—a narcotic addict.

They give this picture.

There may now be 60,000 addicts in the United States—perhaps one for every 3,000 persons, as compared with one for every 400 persons before World War I.

Ninety percent or more of the drug addicts use opiates—drugs that come from opium, which comes from the poppy plant—or preparations with an opiate-like action. All are narcotics.

Most of the rest of the addicts smoke marihuana, the leaves of the female hemp plant. The majority of the smokers get only mildly intoxicated. They are easily amused, do a good deal of giggling, sleep much more than usual, develop big appetites. Marihuana does push unstable persons temporarily out of their minds, and these persons may well be dangerous.

Only a few percent of the addicts use cocaine, which comes from the leaves of the coca plant. Taken by injection, it first stimulates and then depresses the nervous system, starting with the brain. For a few minutes it confers a feeling of tremendous mental and physical power; everything seems to lie within the taker's grasp. But this sensation dies in 10 or 15 minutes, so the addict takes another dose, and another. As toxic effects build up, he becomes temporarily psychotic. He thinks insects are crawling on his skin and that people are watching him. Anybody he meets may appear to be a detective who is persecuting him. He is highly dangerous.

Marihuana and cocaine differ from the narcotics in other ways. They do not produce tolerance, and when the addict can't get them, he does not become sick.

People become addicted to still other drugs—mainly the barbiturates and alcohol, which, in excess, produce similar intoxicating effects. Such addicts are not counted in the usual estimates of drug addicts, nor, as such, are they treated by the Public Health Service hospitals.

SURPLUS SALE

GOVT SURPLUS
EXCESS INVENTORY
BANKRUPT STOCK

12-V DC ROBOT CONTROL MOTOR

● **Item #522.** Powerful DC unit. Geared motor operates lever. Use to operate remote valves, throttles, levers, steering, doors, switches, open-close drapes, etc. Govt. cost $47.50. SALE **$5.95** FOB

STANDARD DIAL PHONE

● **Item #715.** Modern dial phone. Use for extension to main line on private system. Work on any system. Govt. cost $25. SALE ..... **$9.95** Ppd

MIRACLE EPOXY LIQUID METAL

● **Item #1725.** Marvelous new Epoxy chemical metal bonds to any surface. Big writeup in LIFE and READER'S DIGEST. Consists of 2 chemicals in self-measuring tubes. Squeeze out correct amount of each, then apply. Dries steel-hard in 50 minutes. Can be sanded, drilled, tapped, etc. One ton strength. Bonds objects to glass, steel, brass, plastics, wood, aluminum, etc. Kit of 2 self-measuring tubes ..... **$3.95** Ppd

FARMER-CONTRACTOR PUMP

● **Item #200.** 2½" size, 16,500 gph. New ball-bearing centrifugal irrigation-contractor pump. 280 rpm. 65 ft. head. 6" pulley. 2½" intake, 2" discharge. Wt. 37 lbs. Govt. cost $98. SALE ..... **$49.50** FOB

GOLF and PERSONNEL CAR MOTOR

● **Item #573.** Amazing buy! Use for golf cars, factory personnel cars.
● Powerful expensive ball-bearing gear reduction motor runs on any 6-v or 12-v storage battery. Powerful high torque. Shaft speed 150-300 rpm. Full instr. Easily reversible. Wt. 34 lbs. Size 7½"x9"x14". Est. Govt. cost $250. SALE ..... **$19.46** FOB

STORAGE BATTERY WINCH

● **Item #311.** Powerful fully reversible ball-bearing gear reduction winch. 1000-2000 lb. pull. Use on 6 or 12-v battery. Holds 40' of ¼" cable. For trucks, docks, boats. Govt. cost $280. SALE ..... **$46.71** FOB

AIR COMPRESSOR BARGAINS

● For painting, cleaning, tires, termites. A [illegible]ble own outfit.
● **Item #450. DeLuxe Kit.** Compressor, tank, gauge, regulator, paint gun, relief valve, fittings, hose, instructions. List $52. SALE ..... **$43.91** FOB
● **Air Components.** Compressor 1-cyl. **$19.35.** Air tank, **$10.90.** Regulator **$3.95.** Pop-off **$1.95.** Press. Gauge **$1.89.** Finest Paint Gun **$11.50.** Auto Switch **$4.75.** All Ppd. in U. S.

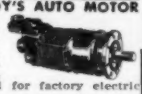
HYDRAULIC EQUIPMENT BARGAINS

Savings to 80%. Build loaders, diggers, presses, etc. All brand new.
● Hydraulic Hand Pump ⅝" Cyl. .. **$29.87** FOB
● Control Valve, 1 or 2 way .... **18.00** Ppd
● Tractor Pump 1000 psi. .... **45.50** Ppd
● 2-Way Cyl. 1¾" bore, 11" stroke **9.87** FOB
Get catalog, many items.

CONTRACTORS LEVEL-TRANSIT

● **Item #804.** Leading make, brand new latest model level-transit with tripod and case. Used by leading builders, schools, etc. 12-X scope, high accuracy, use as level or transit. Limited time offer for **$69.95** Ppd
● Many other instrument buys.

INVALID CHAIR—BOY'S AUTO MOTOR



● **Item #576.** Marvelous ball bearing battery (6 or 12 v.) electric gear reduction motor. Makes wonderful amazing electric drive for boy's auto, invalid's chair, etc. Also useful for factory electric lifts—trucks, etc.
● Gear ratio 33 to 1. High torque. Finest precision gears. Fully reversible. Buy of the year. Size 15½"x5¼". Wt. 27 lbs. Est. Govt. cost over $295. SALE ..... **$15.79** FOB

SPECIAL OF THE MONTH!

GOVT. FIRE EXTINGUISHER

● **Item #120.** New Govt. genuine Phister pressurized carbon-tet extinguisher. Ideal for homes, garages, factories, offices, farms.
● Consists of 2 gal. steel cylinder with 1-gal. carbon-tet, pressurizing pump, pressurizing valve, pressure gauge, 24" hose, nozzle.
● To use simply open valve, compressed air throws powerful stream. No need to invert. Renew air pressure by operating pump or at filling station. Refill carbon-tet readily available. Size 25"x7"x7". Wt. 35 lbs. Govt. cost $89.50. SALE **$19.95** FOB

BATTERY HYDRAULIC PUMP

● **Item #920.** New electric hydraulic pump. Use on lift trucks, loaders, etc.
● Operates on 12 or 6 24-v DC. 1000 p.s.i. 1 to 3 gpm. Inlet and outlet ports ⅜" 14 female threaded. Size 15"x7"x8". 35 lbs. Cost Govt. $175. SALE ..... **$16.95** FOB

115-V to 34-V TRANSFORMER

● **Item #1522.** New. Ideal for DC battery gear motor and DC winch shown in this ad.
● 115-volts to 34 volts at 65 amps. 8"x10"x6". Wt. 48 lbs. Cost $45. SALE ..... **$17.95** FOB

ELECTRICAL-ELECTRONIC BUYS

Typical surplus items in our '59 catalog:
● Radiation Geiger Tubes, cost $20. $ .79
● 905 Cathode Ray Tubes, cost $52.50 4.91
● G.E. Telechron Clock Timer 5.97
● Army HS-30 Head Sets, cost $10.50 1.75
● AC Voltmeter, 0-150-v 3.55

FREE CATALOG

Electronics, Power Tools, Binoculars, Hydraulics, Power Plants, Air Compressors and thousands of other items.

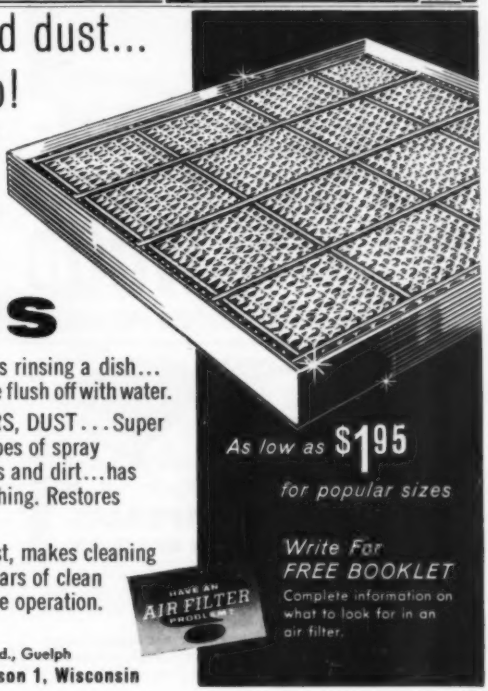
SURPLUS CENTER
LINCOLN NEBR DEPT 232

Trap household odors and dust... SAVE MONEY, too!

RP® EZ KLEEN®

WASHABLE, ALUMINUM

FURNACE FILTERS



Economical because they're WASHABLE. As easy as rinsing a dish... collected dust, dirt, pollen and water soluble adhesive flush off with water.

Amazing adhesive REMOVES ODORS, DUST... Super Filter Coat adhesive, in two types of spray containers, traps and holds odors and dirt... has built-in detergent to simplify washing. Restores like-new efficiency to filter.

Long-lasting ALUMINUM won't rust, makes cleaning easier... lasts for years and years of clean filter service... and improved furnace operation.

As low as **$1.95** *for popular sizes*

Write For FREE BOOKLET

Complete information on what to look for in an air filter.

ASK YOUR DEALER

IN CANADA: Hicks-Baker Ltd., Winnipeg • Spall-Bowman, Ltd., Guelph

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RUSTY

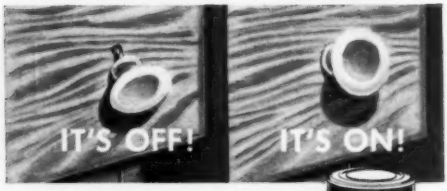
TOOLS?

QUICK! Clean 'em with famous 3-IN-ONE OIL. A few drops every now and then prevents rust and tarnish. Famous for 64 years! On sale everywhere.

3-IN-ONE OIL

REGULAR · OIL SPRAY · ELECTRIC MOTOR

KNOB LOOSE?



Avoid shrinkage with reliable, easy-to-use Plastic Wood. Won't split, holds screws solidly!

For surest results always use GENUINE

PLASTIC WOOD

Handles like putty—hardens into wood!

CLEANS BRUSHES quickly

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RAPID BRUSH CLEANER

This unique liquid quickly cleans bristles of hardest caked paint. Leaves them glossy and springy—never flabby. Ready for instant use. At paint and hardware stores.

Send 25¢ for illustrated Refinishing Manual or write for free folder "Care of Paint Brushes"

Wilson-Imperial Co. 121 Chestnut St. Newark 5 N.J.

Flying the Atlantic by Jet

[Continued from page 95]

pounds of weight for any given power setting. "Hot" air was thinner air, and thinner air required more fuel.

In planning the flight, the dispatcher had probed for soft spots in the prevailing westerlies. The route chosen was not actually the shortest. But lower-velocity winds would mean less time to Gander—2,388 miles and an estimated five hours, six minutes away.

"London Radar," Warren radioed, "Clipper one zero three over Woodley at three thousand, estimating Chepstow one two five three."

"Clipper one zero three," acknowledged Radar, "you are cleared to sixteen five. Change to London Airways on one two one point three."

Warren switched frequencies. London Airways cleared the plane to 30,500 feet. In his own earphones, Capt. Dugan monitored the messages. He was always busiest in the terminal areas. He not only had to fly the airplane but supervise the rest of the flight deck as well.

Ireland and beyond. The Clipper crossed Strumble 30 minutes after takeoff. There, London Airways handed the airplane over to Shannon Airways. It was up to Shannon to give the flight 2,000 feet of altitude separation from oncoming traffic and 20 minutes of time separation from like-altitude westbound traffic.

Miles below, the terrain was a page from a stamp collection. Above, the sky, unaffected by light refractions in the atmosphere, was near-indigo. The plane seemed suspended motionless in space. Back in the cabin, passengers began standing coins on edge on luncheon trays.

Capt. Dugan flipped on his yaw-damper. This was to minimize "Dutch roll," the tendency of swept-wing airplanes like this one, to "hunt." Hunting costs speed.

Over Shannon came this message, "Jet Clipper one zero three, you are cleared to three five zero (35,000 feet) and on your flight-plan track to Gander. Change over to Oceanic Air Control frequency five six seven one primary and eight eight six two secondary."

Capt. Dugan checked his watch. Flight 103 was four minutes behind schedule.

The flight-deck crew had relaxed into a familiar routine, laced with small talk. Engineer Paul Eckhardt studied his en-

 CONTINUED

New "PULL-GEAR" SPEED-REDUCING PULLEY

Provides Correct Speed and Power to Drill Up to 1 3/8" with 1/2 H.P. Motor

Amazing new internally geared speed reducer doubles drill press capacity. Greater power, greater efficiency, greater productivity. Provides the correct speed and power for larger drilling, reaming, tapping and boring on light presses. Easily installed in five minutes. Adaptable to all type machines. Spindle speed range 45 to 3000 RPM. *Write for Literature.*

PULL-GEAR CO. 25429 Mound Rd. Warren, Michigan

Boston, Mass.—Chandler & Farquahar Co., LOngwood 6-7800
Chicago, Ill.—Chicago Supply & Tool Co., EVerglade 4-3933
McMaster-Carr Supply Co., ANdover 3-3161
Cleveland, Ohio—Reynolds Machinery Co.
Hillside, N. J.—Tool Specialties Co., MUrdock 6-8700
Los Angeles, Calif.—Almquist Brothers, LUdlow 8-9111
New York City—Rudolf Bass, WAlker 5-0440
San Diego, Calif.—Acme Tool & Supply Co., CYpress 8-7181
Seattle, Wash.—Star Machinery Co.

GENUINE ALNICO MAGNETS

AMAZING, PERMANENT, NON-ELECTRIC. HIGHLY PRACTICAL. Conduct interesting experiments. Hundreds of uses. Retrieve valuable steel items such as guns, tackle from fresh or salt water, tools from tanks & drains. **GUARANTEED.** Try any magnet one week. Money back if you are not well-pleased.

No. S-710 (Wt. 53 oz.) Has pull of 225 lbs. on steel block.....$18.00
No. S-625 (Wt. 70 oz.) Has pull of 125 lbs. on steel block.....$10.00
No. S-575 (Wt. 18 oz.) Has pull of 75 lbs. on steel block.....$ 7.00
No. S-500 (Wt. 13 oz.) Has pull of 50 lbs. on steel block.....$ 5.00
No. S-90 (Wt. 5 oz.) Has pull of 15 lbs. on steel block.....$ 3.50
No. S-102 Pocket Magnet. 5 lb. pull. 2 for.....$ 1.50
No. S-47 Hot Pad Magnets. 10 for $1.00.....50 for $ 4.87
No. S-35 Hobbyist assortment of 8 magnets.....$ 2.00

Send M.O. or check. We pay postage. Sorry no C.O.D.'s.

MIAMI MAGNET COMPANY, 3240 N.W. 27th Ave., Miami 42, Fla.

The Battery That's Used in Guided Missiles Now Released as Government Surplus

For Photography, Aircraft, Models, Searchlights, Radios, etc. $1.95 ea. Postpaid

Sintered-plate Nickel-Cadmium alkaline storage batteries designed for "Nike" Missile and now surplus due to design change. A lifetime battery with no known limit of service (over 5000 recharges on test without loss of capacity). Other features: Virtually indestructible, compact & lightweight, withstands heavy shock and vibration. Flat voltage curve during discharge, retains charge year or more, high discharge rate up to 50 amps. for this cell, no corrosive fumes to harm clothing or equipment, spill-proof construction, discharge in any position, indefinite storage without deterioration, operates in temperatures -60° F. to +200° F. Each cell is approx. 10 ampere hour capacity, nominal voltage per cell is 1.2 volts. (A 6 V. battery requires 5 cells.) Cell size 6" H. x 2"W. x 1/2" T. Wt. 6 oz. ea. Uses Potassium-Hydroxide (30%) electrolyte. Negligible loss during lifetime service. (Add only distilled water once a year. A fraction of Government cost.

Used Test Cells.....$1.95 ea. Postpaid
Brand New Cells.....2.95 ea. Postpaid

All cells guaranteed to your satisfaction or money refunded (less Postage).

ESSE RADIO COMPANY, Dept. 2J
42 W. South Street Indianapolis 25, Indiana

BUILD THE BEST!

build quality money-saving **knight-kits**®

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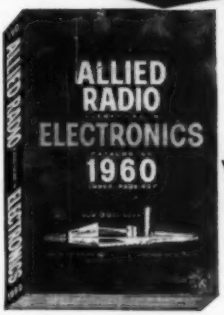

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gine temperatures, rate of fuel flow and the pressure ratio between the inlet air and discharge gases at the tailpipes. The pressure ratio, at 1:2.5, translated into engine-propulsion efficiency. The fuel-flow meters showed the engines were consuming 12,153 pounds an hour—slightly under the estimate. This would add to the plane's endurance.

In front of Eckhardt, Capt. Dugan and First Officer Warren occasionally double-checked Eckhardt's estimates of endurance with their pocket slide rules.

Veteran of the airways. The Atlantic was Capt. Dugan's own pond. In the last 19 years he had flown it 600-odd times. Nevertheless, the speed of his jet impressed him. He could take off in the afternoon, fly down the long arc of the western sun and land hours before twilight.

One hour and 36 minutes after takeoff, Warren contacted the weather ship Jig. He had to do this at least five minutes before he was due abeam of her. The Jig's radar could miss the jet completely, at its speed, if it weren't forewarned.

In a few minutes Jig called back, "Clipper one zero three, bearing one six three, distance four eight point five miles."

That checked with the position fixed by Navigator Dick Killgore. His position report always had to be an estimate; in the few minutes it took him to compute it, the airplane traveled anywhere from 35 to 60 miles.

Flight 103 was now five minutes behind schedule.

Killgore had become the busiest man on the flight deck. Each five degrees of longitude, he had to plot the jet's position for transmission to the appropriate control center. He had a wealth of instruments—Loran, a standard direction-finder, radar, a radio altimeter, a European system called Console and, of course, a periscopic octant. Once each trip he was required to take a star or moon or sun sight through the roof to keep in practice.

Halfway point. At 15:16 p.m., Flight 103 passed from Shannon's control to Gander's control at 30 degrees west longitude. But its "equitime point"—the place where, if necessary, the captain could return to Shannon or go on to Gander, as he chose—was a few minutes beyond

CONTINUED

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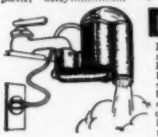

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that, at 32.5 west, due to the headwinds.

The airplane now made up that five minutes. It was exactly on time. There had been a slight drop in the wind velocities used for the "prog."

By the time Capt. Dugan started his glide for Gander, more than 150 miles out from the Newfoundland coast, he had picked up several minutes.

As he approached the lip of the runway, the airspeed indicator was crossing the 137-knot mark, unwinding.

He touched down. When the dual nose wheels had been eased to the pavement, Warren flipped a switch to enfold the tailpipes in "clamshells," and reverse thrust. Dugan inched the throttles forward. The airplane decelerated. He retarded his throttles and touched the brakes.

Flight 103 was across the Atlantic. The automatic flight recorder in the front wheel well, known on the flight deck as the Sputnik, would show a Greenwich time of 17:37, five minutes ahead of forecast. Capt. Dugan had 23,135 pounds of fuel left in his tanks. The estimated burn-off to Gander had been 64,500. He had used 63,765. While the jet was refueled, he walked to Dispatch for his flight plan to New York.

Landing. Two hours and 52 minutes later the control tower at Idlewild, New York International Airport, radioed, "Jet Clipper one zero three, you are cleared to land on runway one three right."

Capt. Art Dugan touched down, decelerated and turned off on a taxiway. He parked his jet on the apron in front of the gold-and-chrome International Arrivals Building. Attendants rolled stairs to the front and rear of the plane. The passengers streamed off, clutching trinkets bought in Oxford Street and the Via Veneto.

It was 4:19 p.m. in New York. Total time for the flight, including the 25-minute stop in Gander, had been 7 hours, 42 minutes. Discounting the stop, the average speed had been 472 miles an hour.

Mary Chugkowski consulted her watch. She would have plenty of time to get home and change before her date.

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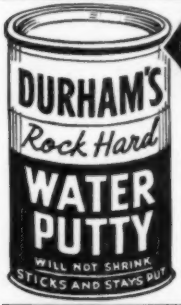

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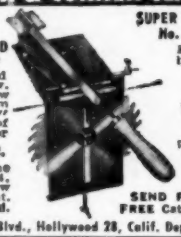

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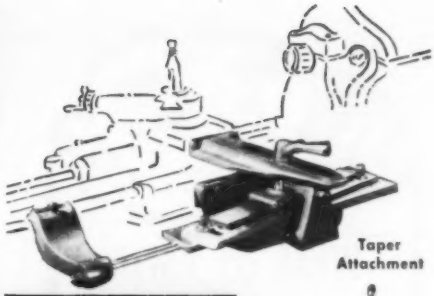

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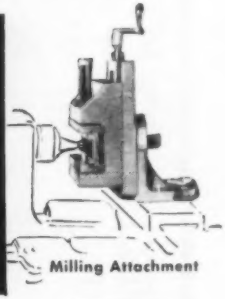

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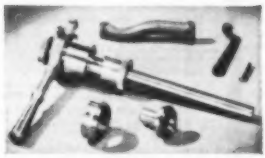

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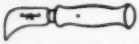

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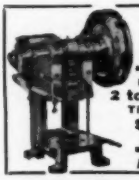

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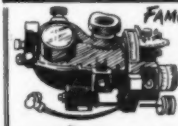

Here it is! The super-secret Norden Bombsight of WW2 fame. Brand new and in working condition. Loaded with precision parts, gears, optical systems, electrical gyro, etc. Ideal for use in aerial fish planting, glider 'bombing' contests or to control large earthmoving equipment. Cost Gov't approximately $6000.00. ONLY 37.50

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Eliminates 12 ITEMS from your pack. Ideal for Camper, Boy Scout, Hunter, Fisherman, Hiker, etc. Includes a knife, fork, spoon, drawknife, bonesaw, fish scaler, scissors, can & bottle opener, corkscrew, awl-punch, screwdriver and file. ALL this plus a leather belt holster.

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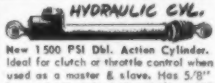
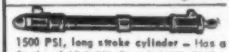


New 1500 PSI Dbl. Action Cylinder. Ideal for clutch or throttle control when used as a master & slave. Has 5/8" bore, 4-1/8" stroke, 7/16" shaft, 9-5/8" closed length. Ports are 1/4" tube (7/16—20 thread). No. H-60 3.75



1500 PSI, long stroke cylinder — Has a Stroke of 15-5/8", Bore 1-3/8", Shaft 1", Length 22". No. H-14
Cost Gov't approx. $120.00
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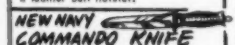

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Why I Believe in Sea Monsters

[Continued from page 103]

The indestructible what-is-it. And here is the most vivid and recent account of all: Five minutes before noon on Dec. 30, 1947, a clear, sunny day, the Grace Liner Santa Clara was steaming southward through calm seas 118 miles east of Cape Lookout, N. C. What happened at that moment was described later to the Associated Press by the ship's captain. This is a part of his story:

"Suddenly, John Axelson (the third mate) saw a snakelike head rear out of the sea about 30 feet off the starboard bow of the vessel. His exclamation of amazement directed the attention of the other two mates to the sea monster, and the three watched it unbelievingly as it came abeam of the bridge where they stood, and was left astern.

"The creature's head appeared to be about 2½ feet across, two feet thick and five feet long. The cylindrically shaped body was about three feet thick and the neck about 1½ feet in diameter.

"As the monster came abeam of the bridge, it was observed that the water around the monster, over an area of 30 or 40 feet square, was stained red. The visible part of the body was about 35 feet long. It was assumed that the color of the water was due to the creature's blood and that the stem of the ship had cut the monster in two.

"From the time the monster was first sighted until it disappeared in the distance astern, it was thrashing about as though in agony. The monster's skin was dark brown, slick and smooth. There were no fins, hair, or protuberances on the head, neck or visible parts of the body."

Brazil is on the far side of the South Atlantic from where we found our giant leptocephalus, and North Carolina is even farther away from there. But it would not be strange if an adult of that mysterious species had managed to swim across an ocean. After all, we marine biologists know that the little fresh-water eels that Danes and other Northern Europeans eat with such pleasure are spawned in the ocean 3,000 miles southwest of where they are caught.

Where to look for giant eels. There are small sea eels, about the size of the fresh-water ones, that breed in the sunlit layers of the ocean in sub-tropical and tropical regions but head for the cold depths as soon as they are grown. We have found them as far as two miles below the surface, living where the temperature is almost constantly around 38 degrees above zero.

I believe that giant eels, grown from larvae such as the one we found off southwest Africa, may very well live in those dark, frigid regions. Since they would spawn around 200 feet below the surface, and die afterwards, as all eels do, their great bodies would normally sink to the ocean bottom without even being seen. But it is conceivable that occasionally one of them, in a bewildered, dying condition, might struggle to the surface after spawning. As it rose, its need for more oxygen would far exceed its capacity to absorb it, and it would find surface temperatures intolerably hot. It would literally suffocate as it reached the air.

Monsters must eat. Where would I expect to find sea serpents? Well, giants must have great quantities of food, of course.

This matter of food, by the way, should enable us to dispose, for all time, of Scotland's notorious Loch Ness monster. Loch Ness, though very deep, is still just a narrow little lake. Where, in that relatively cramped place, would the monster that is supposed to dwell there find enough fish to keep it alive?

The richest feeding grounds in all the seas are off the west coasts of Africa and South America. Here the waters for a thousand feet down are laden with nutrient salts—what farmers would call fertilizer—and teeming with fish. Here is where fishermen catch their biggest game.

Now, I would like to encourage those gentlemen to lengthen their lines and lower them about 100 miles offshore, where the ocean bottom dips steeply downward from around 600 to 6,000 feet. They could bait their big hooks with frozen herring or squid, and they might very well haul up from the depths a giant sea serpent. By the time it reached the surface, it would be in no condition to put up a fight. But they would have a thrilling catch just the same, and make an important contribution to science.

[*Just after this was written, details were announced of another possible way to catch a sea serpent, with the novel trap described in an item accompanying the earlier part of this article.—The Editor.*]

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"I was ashamed to always be so tired!"

I ALWAYS felt simply "run-down." People were thinking of me as a "spoil-sport." I didn't know why until my doctor put me wise. He told me that I acted like a man much older than myself, and explained why I felt "tired," why my energy was slipping away, why my wife and family were beginning to think of me as a worn-out man.

He told me how a vitamin-mineral deficiency could bring on these symptoms, and suggested that I add a good food supplement to my diet.

Well, I put off doing anything about my condition — until one day I read the Vitasafe ad in a magazine offering a 30-day trial supply of high-potency Vitasafe C. F. Capsules! I figured I had nothing to lose, so I mailed the coupon. When my trial supply arrived, I began taking one Capsule a day. In a short time, I began to feel like a new man. My pep and energy increased, I continued with the Vitasafe Plan — and I felt stronger — more energetic!

Today, no one thinks of me as a "worn-out old man." I feel peppier and more energetic than I have in years. And you may, too! Accept this no-risk offer as I did by mailing the postcard today!

A dramatization posed by professional model.

MILLIONS HAVE READ TRUE-TO-LIFE VITASAFE STORIES LIKE THESE...

"Our fights have turned to kisses"

IT'S hard to believe that my wife and I used to fight. She would start nagging at me the minute I got home from work and I would snap right back at her! We argued and bickered so often that we suddenly realized our marriage was breaking up! There wasn't any real reason for it except that both of us always felt so tired that we got on each other's nerves!

Our family doctor gave us some advice that probably saved our marriage. Otherwise normally healthy people, he told us, may become run-down and over-tired because of a vitamin-mineral deficiency. This could easily cause us to feel worn-out, tense and short tempered.

To correct this condition, each of us started taking Vitasafe High-Potency Capsules. Before long we had more pep, more energy — and our dispositions improved. Instead of fighting, we were back in each other's arms.

If you or your wife have lost the pep and energy you used to have...if over-tiredness makes you nervous and bad-tempered with the ones you love, you owe it to yourself to try proven Vitasafe High-Potency Capsules.

A dramatization posed by professional models.

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WHY WE WANT YOU TO TRY A 30-DAY SUPPLY — FREE!

So many otherwise normally healthy people have already tried VITASAFE C.F. CAPSULES with such outstanding results... so many have written in telling us how much better they felt after only a short trial...that we are absolutely convinced that you, too, may experience the same feeling of improved well-being after a similar trial. In fact, we're so convinced that we're willing to back up our convictions with our own money. *You* don't spend a penny for the vitamins! All the cost and risk are *ours*.

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With your free 30-day supply of Vitasafe High-Potency Capsules you will also receive complete details regarding the benefits of an amazing new Plan that provides you regularly with all the factory-fresh vitamins and minerals you will need. By participating in the Vitasafe Plan now you are never under any obligation! When you have received your first 30-day trial supply, simply take one VITASAFE Capsule every day to prove that this formula can help you as it is helping so many others. But you remain the sole judge. If you are not completely satisfied, and do not wish to receive any additional vitamins, simply let us know by writing us before the next monthly shipment — or you can use the handy instruction card we will provide — and no future shipments will be sent. Yes, you are under no purchase obligation ever; you may cancel future shipments at any time!

A VITASAFE PLAN FOR WOMEN

Women may also suffer from lack of pep, energy, and vitality due to nutritional deficiency. If there is such a lady in your house, you will do her a favor by bringing this announcement to her attention. Just have her check the "Woman's Plan" box in the postcard.

But if you are delighted — as so many people already are — you don't do a thing and you will continue to receive fresh, additional shipments regularly every month — for just as long as you wish, automatically and on time — at the low Plan rate of only $2.78 plus a few cents shipping for each full month supply. You take no risk whatsoever — you may drop out of this Plan any time you wish without spending an extra penny, by simply notifying us of your decision a few days before your next monthly shipment. Take advantage of our generous offer! Mail postcard NOW.

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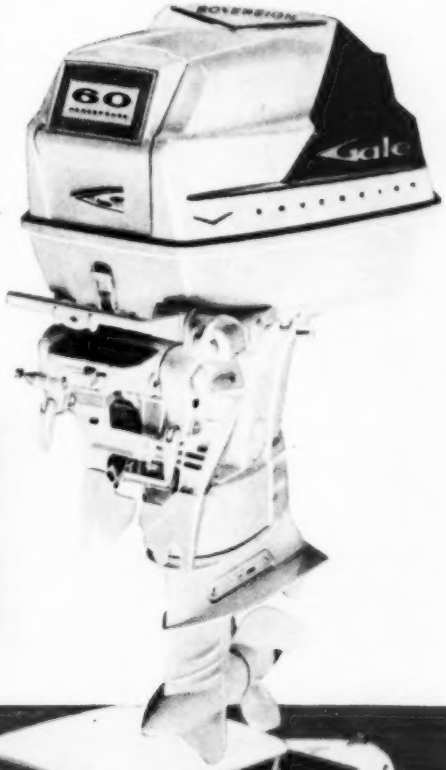

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